Barnstable AIRPORT HYANNIS

Draft Phase II Comprehensive Site Assessment

Barnstable Municipal Airport
Hyannis, Massachusetts

RTN 4-26347

December 2020

Prepared for:
Barnstable Municipal Airport
480 Barnstable Road
Hyannis, MA 02840

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DRAFT PHASE II COMPREHENSIVE SITE ASSESSEMENT
BARNSTABLE MUNICIPAL AIRPORT
480 BARNSTABLE ROAD
HYANNIS, MASSACHUSETTS
RELEASE TRACKING NUMBER 4-26347

1.0 INTRODUCTION

The Horsley Witten Group, Inc. (HW) has been retained by the Barnstable Municipal Airport (the "Airport") to prepare a Draft Phase II Comprehensive Site Assessment (Phase II) for its property located at 480 Barnstable Road, Hyannis, Massachusetts (Figure 1). The Phase II focuses on the release of Per- and Poly-Fluoroalkyl Substances (PFAS) in soil and groundwater and 1,4-dioxane in groundwater.

The nature and extent of the release has been assessed. Based on a Method 1 Risk Characterization a condition of no significant risk has not been achieved due to the presence of the following:

- PFAS in soil greater that the applicable Method 1 S-1/GW-1 standards; and
- PFAS and 1,4-dioxane in groundwater greater than the applicable Method 1 GW-1 standards.

HW has prepared this Phase II in accordance with the Massachusetts Contingency Plan 310 CMR 40.0000 (MCP). The Phase II has also been prepared consistent with the Final Public Involvement Plan for the Airport dated September 16, 2019 (the "Final PIP"). Consistent with the Final PIP, all persons identified on Table 1, Community Notification List, have been notified on the availability of the Phase II. The Airport is providing a 21-day review period to allow for comments from the public and Massachusetts Department of Environmental Protection ("MassDEP"). The Airport will accept comments on the Draft Phase II Comprehensive Site Assessment until January 4, 2021. Comments received by the public and MassDEP will be documented and addressed in the Final Phase II Comprehensive Site Assessment which will be submitted to the MassDEP by February 5, 2021.

For the purpose of this report, the term "Airport" specifically refers to the Barnstable Municipal Airport property located at 480 Barnstable Road, as set forth above, and the term "Disposal Site" refers to the area impacted by the release of oil and/or hazardous material (OHM) subject to Release Tracking Number (RTN) 4-26347. A Site Locus Map and the Disposal Site Map are provided as Figures 1 and 2.

2.0 EXECUTIVE SUMMARY

The Airport has completed the Phase II consistent with the MCP requirements set forth in 310 CMR 40.08333. The Phase II is based on the collection and laboratory analysis of the following:

- 121 soil samples for laboratory analysis of PFAS;

- Three surface water samples for laboratory analysis of PFAS;
- 101 groundwater samples for laboratory analysis of PFAS; and
- 41 groundwater samples for laboratory analysis of 1,4-dioxane.

As documented in the fact sheet titled "*Interim Guidance on Sampling and Analysis for PFAS at Disposal Sites Regulated Under the Massachusetts Contingency Plan"* prepared by the MassDEP and dated October 21, 2020, the following six PFAS analytes are currently regulated:

- Perfluorodecanoic Acid (PFDA)
- Perfluoroheptanoic Acid (PFHpA)
- Perfluorohexanesulfonic Acid (PFHxS)
- Perfluorooctanoic Acid (PFOA)
- Perfluorooctanesulfonic Acid (PFOS)
- Perfluorononanoic Acid (PFNA)

Although MassDEP is currently regulating the six PFAS analytes described above, it does recommend that the 14 analytes included in EPA Method 537.1.1 be evaluated to determine if other PFAS analytes may be present. MassDEP has not yet provided toxicity information sufficient for the purposes of conducting a MCP risk assessment beyond the six PFAS analytes documented above (refer to the Technical Support Document titled "*Per-andpolyfluoroalkly Substances (PFAS): An Updated Subgroup Approach to Groundwater to Groundwater and Drinking Water Values*" prepared by the MassDEP and dated December 26, 2019).

The Airport has gone beyond the list of 14 PFAS analytes included in EPA 537.1.1 and is currently evaluating the PFAS release using approximately all 21 to 24 compounds that are reported by the laboratory. The sum of all 21 to 24 compounds was used to determine "Total PFAS" present in soil, groundwater and surface water.

Forensic techniques including data normalization and the preparation of Radar Plots for the purpose of distinguish PFAS sources has also been conducted. Radar plots generated for each of the groundwater monitoring wells tested both on and off Airport property identified 6:2 Fluorotelomer Sulfonic Acid (6:2 FTS) as a distinguishing analyte used to determine if the PFAS impacted groundwater downgradient of the Airport was related to the Airport's AFFF usage or from another off-site source. As indicated on Figure 2, PFAS impacted groundwater is migrating onto the Airport from upgradient sources that is not consistent with the PFAS plume associated with Airport. Additionally, as indicated on Figure 2, the PFAS plume associated with the Airport does not appear to have migrated to the Maher wells.

The Airport has also controlled a majority of the sources of PFAS in soil and groundwater relating to the historic deployment of aqueous film-forming foam ("AFFF") by the installation of two non-permeable caps. The cap installations were completed in September 2020 and additional details are included in the report titled "Immediate Response Action Plan Status

Report 8 dated October 2020 and available for direct download from the MassDEP Searchable Sites Database using RTN 4-26347.

In 2016, the Airport purchased an Ecologic Cart system to prevent the discharge of AFFF on the ground surface during testing. The Ecologic Cart allows the Airport to test the fire truck's ability to properly mix and dispense foam without actually mixing or dispersing the AFFF. This unit was the first unit purchased for any Massachusetts airport and well before final FAA testing and approval for universal use at airports. The Airport discontinued testing with AFFF in 2016.

Monitoring wells installed hydraulically upgradient of the Airport identified 1,4-dioxane in groundwater. Based on substantial testing both on and off the Airport, the source of 1,4-dioxane that is impacting both the Airport and the Maher wells appears to be related to an off-site source.

3.0 DISPOSAL SITE INFORMATION

Pursuant to 310 CMR 40.0835(4)(a), (b) and (c), a Phase II Comprehensive Site Assessment shall include the following Disposal Site information.

3.1 Disposal Site Name and Location

Pursuant to 310 CMR 40.0835(4) (a) the Disposal Site name and location are set forth below.

Barnstable Municipal Airport
480 Barnstable Road
Hyannis, Massachusetts 02601

3.2 Disposal Site Map

Pursuant to 310 CMR 40.0835(4)(b), Figure 2 provides a detailed Disposal Site Map depicting all investigatory sampling points relevant to the Comprehensive Site Assessment and the boundaries of the Disposal Site.

3.3 Disposal Site History

Pursuant to 310 CMR 40.0835(4)(c), the Disposal Site History is set forth below.

3.3.1 General Airport Description

The Airport is located in Hyannis, Massachusetts, and provides scheduled airline service, general aviation services and other aviation related activities. The Airport is owned by the Town of Barnstable and is managed through the Barnstable Municipal Airport Commission ("BMAC"). The Airport began as a private airport consisting of a single grass runway before being given to the Town of Barnstable in the 1930's. With the outbreak of World War II, the

Airport was taken over by the federal government for wartime training and defense purposes. During the 1940's, the United States Navy used the Airport and expanded the airfield to include three runways. In 1946, the Airport was returned to a two-runway municipal airport (each runway has a designation at each end, being 15-33 and 6-24). In 1948, the Airport was conveyed by the United States government (pursuant to the Surplus Property Act of 1944) to the Town of Barnstable, acting by and through its Airport Commission.

The Airport is comprised of approximately 645 acres of land, with approximately 140 acres that are impervious (e.g., paved areas such as parking lots, runways, taxiways, aircraft parking aprons, concrete walkways, and building rooftops). The Airport's structures include the main terminal and the Air Traffic Control Tower ("ATCT"), which are located south of the runways and taxiways, as well as several hangars used for general aviation and operations services. In addition, the Airport Rescue and Fire Fighting ("ARFF") building is located in the southeast corner of the property. The Airport is located in an area of Hyannis zoned for Business and Industrial uses. A topographic map with the Airport property boundary outlined is attached as Figure 1 and the area impacted by the release of PFAS and 1,4-Dioxane are indicated on Figure 2.

3.3.2 General Regulatory History

The evaluation for 1,4-dioxane at the Airport began in July 2015 when the MassDEP requested samples be collected from existing monitoring wells to evaluate the presence or absence of this compound on Airport property. The request was related to the detection of 1,4-dioxane at the Maher Well field and the potential for the detection to be attributed to historic releases from a floor drain at the former Provincetown Boston Airlines hangar (currently leased to Cape Air). The historic release had been known to contain 1,1,1-trichloroethane (1,1,1-TCA). 1,1,1-TCA is a product known to potentially contain 1,4-dioxane.

In August 2016, the Airport conducted an initial round of groundwater sampling to evaluate the presence of PFAS compounds, also at the request of MassDEP. Subsequently, a Notice of Responsibility (NOR), dated November 10, 2016, was issued to the Airport by the MassDEP. The NOR requested that the Airport conduct additional field investigations to evaluate:

- The source(s) of PFAS including perfluorooctanesulfonic acid (PFOS) and perfluorooctanoic acid (PFOA) detected in groundwater at the Airport;
- The source(s) of 1,4-dioxane detected in a monitoring well downgradient of the Airport on the Maher wellfield property; and
- To identify potential impacts to public water supply wells operated by the Hyannis Water District at the Mary Dunn and Maher wellfields.

A proposed Immediate Response Action (IRA) plan was submitted to the MassDEP for approval in response to the NOR. Subsequently, a meeting was held by MassDEP at the Airport that included other stakeholders including the Barnstable Department of Public Works, the Hyannis

Water District and Barnstable County representatives (representing the Fire Training Academy). At the meeting, IRA plans were coordinated between the Airport and Fire Training Academy including sampling locations, type of analysis, groundwater modeling, goals and next steps. The IRA plan served as the guide for the soil and groundwater testing conducted since November 2016 to follow up on the results of the previous analyses.

In June 2019, the MassDEP issued a Request for Modified Immediate Response Action Plan/Interim Deadline dated June 18, 2019 (the "Modified IRA Request") to the Airport. The Modified IRA Request asked that the Airport propose response actions to *"reduce infiltration of precipitation through PFAS-impacted soil, such as temporarily capping the source areas; excavating and properly disposing of the PFAS-impacted soil; or some equivalent approach".* The Airport's response is documented in the report titled *Final Immediate Response Action Plan Modification,* prepared by HW and dated December 2019 (the "IRA Modification"). The IRA Modification included details for the installation of a cap in two select areas to reduce precipitation infiltration. The two areas are identified as the Deployment Area and the Airport Rescue and Fire Fighting/Snow Removal Equipment (ARFF/SRE) Area. The two capped areas total approximately 94,100-square feet and represent a majority of the known PFAS source areas at the time of the report relating to the historic use of AFFF. The caps were completed in September 2020 and are documented in the report titled *Immediate Response Action Plan Status Report 8.* The surficial extent of the two capped areas is indicated on Figure 3.

3.3.3 Sources of PFAS at the Airport

The source of PFAS related to Airport operations is from the use of AFFF for training and emergencies. Personnel working at the Airport since 1980 were consulted to determine when AFFF use occurred for training purposes or during an actual aircraft accident. Details concerning AFFF usage is set forth below.

<u>AFFF Usage for Training</u>

- Annual testing per Federal Aviation Administration ("FAA") regulations is required to ensure that the foam used by the Airport consists of the appropriate AFFF to water mixture. Historically, the test consisted of shooting the mixture of AFFF from the fire rescue vehicle at a small square target. Adjustments were then made, if needed, to allow for proper spray coverage consistent with the FAA regulations.
    - Approximately 80 gallons of 3-percent AFFF concentrate was historically used annually to conduct the test.
    - All testing has been conducted in the same location on the Airport since at least 2000 (Deployment Area).

- In 2016 the Airport purchased an Ecologic Cart system to prevent the discharge of AFFF on the ground surface during testing. The Ecologic Cart allows the Airport to test the fire truck's ability to properly mix and dispense AFFF without actually mixing or

dispersing the AFFF. This unit was the first unit purchased for any Massachusetts airport and well before final FAA testing and approval for universal use at airports.

- FAA regulations require a Tri-Annual Drill which is a full-scale live exercise that simulates a major airport disaster to test the emergency coordination and response skills of the Airport and other first responders. With the exception of the drill in 1991 as shown on the Figure 2, all drills occurred at the Deployment Area as indicated on Figure 2. The tri-annual drills occurred as follows:
    - July 17, 1991
    - Nov. 16, 1994
    - Nov. 17, 1997
    - Nov. 2, 2000
    - Oct. 18, 2003
    - Oct. 25, 2006
    - Oct. 22, 2009
    - Oct. 11, 2012
    - Oct. 28, 2015 (No AFFF used during this drill – just water)
    - Sept 5, 2018 (No AFFF used during this drill – just water)

- FAA regulations require a supply of AFFF concentrate on hand to resupply two trucks. This is approximately 405 gallons of the 3-percent AFFF concentrate. The concentrate is stored in the ARFF/SRE Building located in the ARFF/SRE Area as indicated on Figure 2.
- The Airport removes expired AFFF that is no longer useable using a licensed waste disposal company.

Firefighting hoses used for training or emergencies are cleaned and stored on the trucks or in the ARFF/SRE Building fire bays. The hoses, when needed to be cleaned, are done so within the ARFF building only. The ARFF/SRE feature a floor drain discharging to an oil/water separator for pretreatment prior to discharge to the municipal sewer under a permitted connection.

<u>AFFF Usage for Emergencies</u>

- Personnel working at the Airport since 1980 were consulted to determine when AFFF use occurred during an actual aircraft accident and only two instances were identified. Please note that AFFF is NOT used unless there is a spark of fire. The majority of accidents do not result in the use of AFFF.
    - 1981 crash of a Beech 18 aircraft east of runway 24 between Yarmouth Road and the Airport (off-Airport property).

- 2016 crash of a Cirrus aircraft in the parking lot of the rental car facility west of the terminal building. Approximately 10 gallons of the 3-percent AFFF concentrate was used during the crash response. 100% of this AFFF liquid was contained within a solid bottom manhole and removed during response actions.

AFFF Purchase Quantity and Usage

The following quantities of AFFF concentrate have been purchased and used by the Airport since 2000:

Year	AFFF Type	AFFF 3% Concentrate Purchased	Approximate AFFF 3% Concentrate Used for Training	Approximate AFFF 3% Concentrate Used for Tri-Annual Drill	Approximate AFFF 3% Concentrate Used for Annual Testing	Approximate Total AFFF Concentrate Used Annually	Approximate Total AFFF Concentrate and Water Mix	Approximate AFFF Stockpiled Based on Use*
		(Gal.)	(Gal.)	(Gal.)	(Gal.)	(Gal.)	(Gal.)	(Gal.)
2000	Chem-Guard 3% mil-spec foam	200	0	40	80	120	4000	485
2001	None purchased	0	0	0	80	80	2667	325
2002	Chem-Guard 3% mil-spec foam	30	0	0	80	80	2667	355
2003	Chem-Guard 3% mil-spec foam	40	0	40	80	120	4000	325
2004	Chem-Guard 3% mil-spec foam	40	0	0	80	80	2,667	365
2005	None purchased	0	0	0	80	80	2,667	325
2006	Chem-Guard 3% mil-spec foam	220	0	40	80	120	4,000	505
2007	Chem-Guard 3% mil-spec foam	25	0	0	80	80	2,667	350
2008	Chem-Guard 3% mil-spec foam	90	0	0	80	80	2,667	415
2009	Chem-Guard 3% mil-spec foam	90	0	40	80	120	4,000	375

Year	AFFF Type	AFFF 3% Concentrate Purchased	Approximate AFFF 3% Concentrate Used for Training	Approximate AFFF 3% Concentrate Used for Tri-Annual Drill	Approximate AFFF 3% Concentrate Used for Annual Testing	Approximate Total AFFF Concentrate Used Annually	Approximate Total AFFF Concentrate and Water Mix	Approximate AFFF Stockpiled Based on Use*
		(Gal.)	(Gal.)	(Gal.)	(Gal.)	(Gal.)	(Gal.)	(Gal.)
2010	Chem-Guard 3% mil-spec foam	100	0	0	80	80	2,667	425
2011	Chem-Guard 3% mil-spec foam	180	0	0	80	80	2,667	505
2012	None purchased	0	0	40	80	120	4,000	285
2013	None purchased	0	0	0	80	80	2,667	325
2014	Chem-Guard 3% mil-spec foam	180	0	0	80	80	2,667	505
2015	Chem-Guard 3% mil-spec foam	265	80	40	80	200	6,667	470
2016 **	Chem-Guard 3% mil-spec foam	250	0	0	80	80	2,667	575
2017	None purchased	0	0	0	0	0	0	575
2018	None purchased	0	0	0	0	0	0	575
2019	Chem-Guard 3% mil-spec foam	105	0	0	0	0	0	680
2020	None purchased	0	0	0	0	0	0	680***
Total Quantity Between 2000-2020		1,815	80	240	1,360	1,680	56,000	Not Applicable

Notes:

* The Airport is required by FAA regulations to have enough stockpiled AFFF on hand to resupply two (2) trucks. This is approximately 455 gallons of the 3% AFFF concentrate.

** In May 2016, the Airport transitioned to the new formulation of Chemguard

*** The total on-hand AFFF quantity as of October 2020 is 862 gallons. This includes 455 gallons within containers and 407 gallons within the ARFF Trucks.

PFAS from Non-Airport Related Sources

Analytical testing of several wells located hydraulically upgradient of the Airport have determined that several PFAS plumes are entering the Airport from different areas. The additional PFAS plumes are unrelated to the Airport's AFFF PFAS plume. These plumes also appear to also be impacting the Maher well field. These plumes appear to be originating from the Barnstable Fire Training Academy PFAS Release Site (RTN 4-26179) and other unknown upgradient locations located to the west and northwest of the Airport. Radar plots (Appendix A) were used to distinguish the Airports PFAS AFFF plume from other non-Airport related PFAS sources. The Radar plot from HW-I (s) is a good representation of the Airport's plume which is recognizable by a high percentage of 6:2 FTS and low percentage of PFOS. Additionally, 6:2 FTS does not degrade into PFOS or PFHxS.

A Radar Plot is a graphical representation of analytical data that is used to create a distinguishable fingerprint. To generate a Radar Plot, each PFAS groundwater sample was statistically normalized to the individual total PFAS concentration. The Total PFAS concentration is the sum of all laboratory reported PFAS analytes in a sample. Each PFAS analyte was then divided by Total PFAS to calculate the percent each analyte contributed to the Total PFAS concentration. These percentages were then plotted for each sampling location and the graphical representation of the data set was compared.

Refer to Figure 2 for a depiction of the Airport AFFF Plume and other non-airport related PFAS plumes. Cross-sections including radar plots also document the extent of the Airport and other PFAS plumes. Refer to Figures 4 through 10 for select cross-sections.

3.3.4 Sources of 1,4-Dioxane

1,4-dioxane is a synthetic chemical that is completely mixable in water. It has been detected in one deep monitoring well (HW-L [d]) located at the Airport and within several monitoring wells located hydraulically upgradient and downgradient of the Airport. A potential source of 1,4-dioxane at the Airport is a historic release of 1,1,1-TCA (RTN 4-00823) from an oil/water separator associated with a floor drain in the former Provincetown Boston Airlines hangar (currently leased to Cape Air). Given the screen depth of the detections at and downgradient of the Airport (70 to 123 feet below grade), the 1,4-dioxane is likely from an off-Airport source.

All floor drains within the hangers and businesses located on the airfield have either been closed, connected to a tight tank and/or connected to the sanitary sewer to meet the United States Environmental Protection Agency (EPA) and MassDEP discharge requirements. According to the EPA document titled *Technical Fact Sheet – 1,4-dioxane* dated November 2017, sources of 1,4-dioxane include:

- **Solvent Stabilizer** – historically, 90% of 1,4-dioxane use was to stabilize chlorinated solvents such as 1,1,1-TCA. Use of 1,4-dioxane as a solvent stabilizer was phased out

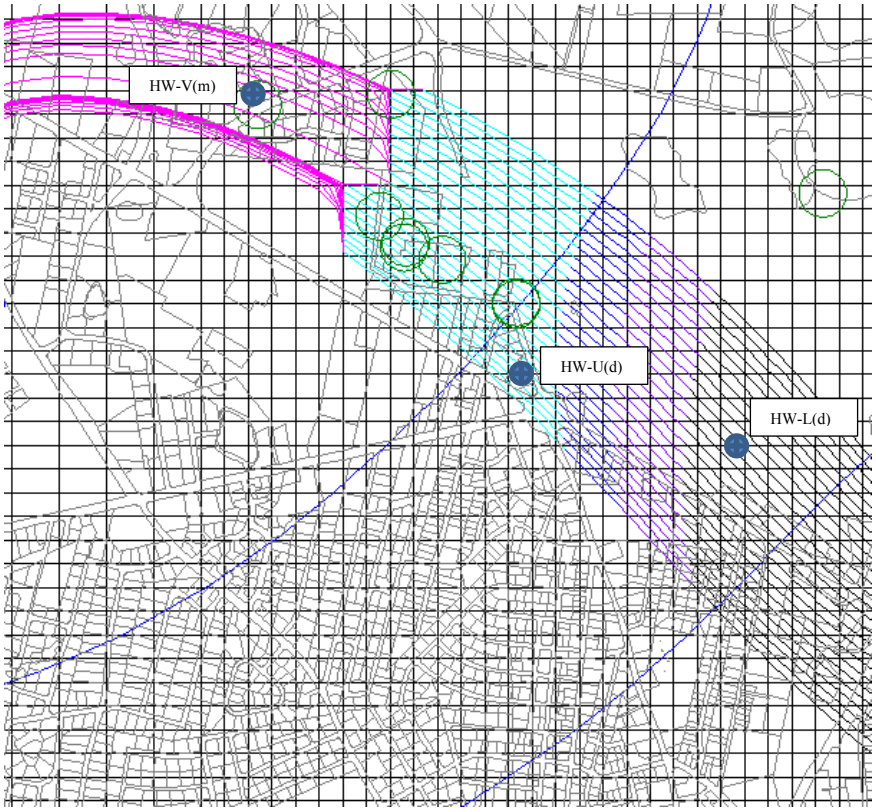
under the 1995 Montreal Protocol. Testing of groundwater from 12 wells screened at various depths at the Airport in an area of a historic release of chlorinated solvents did not identify 1,4-dioxane in groundwater above the laboratory reporting limit. 1,4-dioxane has only been detected in one deep well located approximately 4,000 feet hydraulically downgradient from the historic release area.

- **Consumer Products** - 1,4-dioxane has been found as a by-product in paint strippers, dyes, greases, anti-freeze and aircraft deicing fluids, and in some consumer products such as deodorants, shampoos, and cosmetics. The Airport installed a centralized de-icing and aircraft washing pad in 2015 which directs de-icing fluids and fluids used in aircraft washing to the Barnstable Water Pollution Control Facility. The deicing pad is located on the North Ramp in proximity to the former solvent release area.
- **Pharmaceuticals and Plastic Manufacture** - 1,4-dioxane is used in the manufacture of pharmaceuticals as a purifying agent and is a by-product in the manufacture of polyethylene terephthalate plastic.
- **Food** - 1,4-dioxane may be present in some food supplements, food containing residues from packaging adhesives or on food crops treated with pesticides that contain 1,4-dioxane.

Some examples of how these materials can be released to the environment include:

- Releases to the ground surface, groundwater and/or surface water from industrial/commercial facilities where spills of materials containing 1,4-dioxane have occurred;
- Releases to groundwater and/or surface water from wastewater treatment plants where wastewater treatment methods were not designed to remove 1,4-dioxane compounds from the waste stream;
- Releases to groundwater and surface water from residential septic systems where 1,4-dioxane compounds were used in the household;
- Releases to the ground surface, groundwater and/or surface water from industrial facilities where polyethylene terephthalate plastic was manufactured; and
- Releases to groundwater and/or surface water from landfills were 1,4-dioxane wastes were disposed of.

To determine if the source of 1,4-dioxane detected in HW-L(d) was related to an off-site source, HW advanced monitoring wells HW-U(d) and HW-V(m) at locations hydraulically upgradient of the Airport (Figure 11). The well screen depths for these locations were chosen based on particle tracking which indicated that the depth of the 1,4-dioxane detected at the Airport and the Maher Well field was likely related to a release site located upgradient of the Airport. The particle tracking model uses annualized average pumping rates for 2004-2008 from the Maher Wells, Mary Dun Wells and the Airport Well. The particle tracking is shown below:



Based on the results of the modeling and laboratory data, it appears that the detection of 1,4-dioxane at the Airport and the Maher Wells is related to an unknown off-site source. A graphical representation of the 1,4-dioxane plume is also indicated on Figure 7.

4.0 DISPOSAL SITE HYDROGEOLOGICAL CHARACTERISTICS

Pursuant to 310 CMR 40.0835(4)(d), the Site hydrogeological characteristics including details of subsurface investigation and hydrogeologic conditions are set forth below.

4.1 Subsurface Investigations and Assessments Conducted

Pursuant to 310 CMR 40.0835(4)(d)1, a description of all relevant geologic, hydrologic, geophysical and other subsurface investigations conducted at the Disposal Site are set forth below.

- The installation of groundwater monitoring wells at six locations in April 2017: in the vicinity of potential sources of PFAS at the ARFF/SRE Area, at the Deployment Area and at upgradient locations outside of the Airport to evaluate potential off-site sources of PFAS and 1,4-dioxane.
- Groundwater from the new wells was initially sampled for PFAS and 1,4-dioxane in April 2017. Additional groundwater samples and one surface water sample were collected for analysis of PFAS on June 20, 2017.

- An initial round of three soil samples were collected on December 9, 2016. One sample was taken from each location where it was determined that AFFF had been used at the Airport. The areas included the MCI Drill Area, the Deployment Area, and the 1991 Drill Location.
- A second round of soil samples were collected on June 20, 2017 adjacent to the ARFF Building Area and within the Deployment Area to begin to determine the extent of PFAS within the surface soils. Based on the results of these analyses, a third round of samples from these two locations were collected on September 26, 2017. The third round of sampling was designed to further delineate the extent of PFAS in soils both horizontally and vertically, with samples taken at the ground surface and at two and four feet below ground surface (BGS).
- In October 2017, three composite soil samples were taken from piles of sediment and topsoil associated with the redevelopment of Runway 15/33. These piles were located on Airport property at the site of the former Mildred's Restaurant and were analyzed for PFAS compounds to evaluate if sediment removed from the Airport as part of this redevelopment contained PFAS.
- Two samples of AFFF concentrate were analyzed for PFAS compounds to evaluate the foam.
- Six PFAS soil samples were also analyzed for leaching potential using a synthetic precipitation leaching procedure (SPLP) test between September and October 2017. The chosen samples included four samples from within the boundaries of the PFAS sites at the Airport and two samples from runway reconstruction soils stockpiled at the Airport.
- In October 2017, 20 surface samples were collected both on and off Airport property to determine the background concentration of PFAS in the area not related to the application of AFFF.
- On August 14, 2018, 24 PFAS surface soil samples were collected in proximity to the ARFF Building Area and the Deployment Area. PFAS compounds were previously detected in these areas and additional samples were collected to determine the vertical extent of PFAS impacts in soil and to refine the soil disposal site boundary at the Airport.
- In October 2018, three soil borings (DL11, DL14 and HW-F) were advanced in the Deployment Area. One soil boring (ARFF3) was advanced, and one surface soil sample (HW-3) was collected near the ARFF Building in order to further delineate the extent of PFAS in soils both horizontally and vertically. All soil borings were advanced using direct push methods.
- In October 2018, six monitoring wells were installed at the Airport. A cluster of three wells (HW-G(s), HW-G(m), and HW-G(d)) was installed at an upgradient location to evaluate potential off-site sources of PFAS. Three additional wells (HW-H, HW-I, and HW-J) were installed southeast of the Deployment Area adjacent to the East Ramp.

- In November 2018, six groundwater samples were collected to evaluate PFAS concentrations in the Deployment Area. Four groundwater samples and one surface water sample from Mary Dunn Pond were also collected for analysis of oxygen and hydrogen isotopes to determine the contribution of pond water from Mary Dunn Pond to the four downgradient monitoring wells.
- In December 2018, two soil samples were collected from the 1991 Drill Location to determine if PFAS detected in the area are related to background conditions.
- In December 2018, 12 groundwater samples were collected for analysis of PFAS and 13 groundwater samples were collected for analysis of oxygen and hydrogen isotopes to determine the contribution of pond water from Mary Dunn Pond to the 13 downgradient wells. Groundwater samples were also collected from four monitoring wells in the Maher Wellfield for analysis of 1,4-dioxane.
- In February 2019, three additional surface soil samples were collected to further delineate the soil Disposal Site boundary around the ARFF building.
- In May and June 2019, HW installed nine groundwater monitoring wells to delineate the vertical and horizontal extent of PFAS and 1,4-dioxane at the Airport and on adjacent hydraulically upgradient properties.
- In June 2019, eight groundwater samples were collected from newly installed groundwater monitoring wells HW-L, HW-K, HW-I (m), HW-I (d), HW-M, HW-D(d), HW-D (dd), and HW-N for PFAS.
- In July 2019, one groundwater sample was collected from the newly installed groundwater monitoring wells HW-O for PFAS. One groundwater sample was collected from HW-L for 1,4-dioxane.
- In July 2019, two surface water samples were collected from Upper Gate and Lewis Ponds for PFAS analysis.
- In August 2019, four groundwater samples were collected from monitoring wells HW-N, HW-A(d), HW-O, and HW-1 to evaluate potential sources of 1,4-dioxane entering the Airport from unknown upgradient sources(s). One groundwater sample was also collected from groundwater monitoring well HW-E for PFAS.
- In August 2019, soil sample DL 11 (0-1) was collected from the Deployment Area.
- In August 2019, six spray water samples were collected from discharge locations on a fire truck at the Airport. The samples were collected verify that the valve mechanism that controls the mixing of AFFF with water was working appropriately. PFAS should not be detected in the spray water.
- On September 27, 2019, HW collected groundwater samples from six monitoring wells located on the Airport for 1,4-dioxane analysis.
- In November 2019, the Airport replaced the valve mechanism in the fire truck to ensure that AFFF was no longer mixing with the water despite the mechanism not being

engaged. In December 2019, HW resampled the six discharge locations from the fire truck at the Airport. PFAS was not detected above the GW-1 standard in any of the samples collected.

- Between May 5th and May 21st, 2020 HW 16 collected groundwater samples PFAS analysis.
- Between May 5th and May 13th, 2020 HW collected groundwater samples from four monitoring wells for 1,4-dioxane analysis.
- Between September 14th and September 24th, HW and Desmond Well Drilling installed 13 monitoring wells.
- On September 17, 2020 HW collected groundwater samples from the three Maher Wells (ME-1 through ME-3) for PFAS analysis.
- Between September 14th and September 30th, 2020 HW collected 21 soil samples for PFAS analysis.
- Between October 1 and October 7, HW collected groundwater samples from 16 monitoring wells for PFAS.
- On October 2 and 7, 2020 HW collected groundwater samples from four monitoring wells for 1,4-dioxane analysis.
- On November 9, 2020 HW collected four samples for PFAS analysis.
- On November 20, 2020 HW collected groundwater samples from two wells for PFAS analysis.

PFAS and/or 1,4-dioxane sampling locations are indicated on Figures 3 and 11 through 14. Tabulated analytical data is included on Tables 2 through 6.

4.2 Soil Boring and Monitoring Well Construction Logs

Pursuant to 310 CMR 40.0835(4)(d)2, copies of soil boring and monitoring well logs completed by HW and others are included in Appendix B.

4.3 Geologic and Hydrogeologic Conditions

Pursuant to 310 CMR 40.0835(4)(d)3, a characterization of all geologic and hydrogeologic conditions at the Disposal Site is set forth below.

4.3.1 Groundwater Characteristics

Pursuant to 310 CMR 40.0835(4)(d)3a, a discussion of groundwater potentiometric surface, gradient, flow rate and flow direction is set forth below.

As indicated on Figure 2, groundwater is estimated to flow generally in a southeasterly direction. Based upon the groundwater elevations, the estimated hydraulic gradient is set forth below.

Start (Well ID)	End (Well ID)	Distance (Feet)	Change in Groundwater Elevation (feet)	Hydraulic Gradient (Feet per foot)	Well Start Location	Well End Location
HW-1	HW-23	1,477	2.7	0.0018	North Ramp	North Ramp
HW-1	HW-4M	325	0.66	0.0020	North Ramp	North Ramp
HW-23	HW-L(d)	3,175	9.42	0.0029	North Ramp	ARFFF Area
HW-302	OW-9(s)	1,201	6.57	0.0054	Steamship Parking Lot	Maher Well Field
HW-E	HW-I(s)	507	1.57	0.0030	Deployment Area	Deployment Area

Groundwater velocity at the Site is estimated by the following equation:

$$\text{Velocity (ft/d)} = \frac{\text{Hydraulic Conductivity (ft/d)} \times \text{Hydraulic Gradient (ft/ft)}}{\text{Effective Porosity}}$$

ft/d = feet per day
ft/ft = feet per foot

Based upon the soil characteristics observed at the Airport in the saturated zone (primarily fine to medium sand), the estimated hydraulic conductivity at the Airport is estimated to be 2.83 to 28.34 feet per day (Freeze and Cherry, 1979) and based on experience in the area effective porosity is assumed to be 33 percent (25-50 percent, Freeze and Cherry, 1979). Therefore, the groundwater velocity is estimated to range between 5.63 to 111.71 feet per year.

4.3.2 Soil Characteristics

Pursuant to 310 CMR 40.0835(4)(d)3b, a discussion of soil type(s), stratigraphy and permeability is set forth below.

In general, soils at the Airport in proximity to the Deployment Area and ARFF/SRE Area consisted of fine to medium sand, with some coarse sand, gravel and cobbles down to a depth of approximately 70 feet below ground surface. Below 70 feet, a layer consisting of gray silt and clay exists. The materials encountered during the soil borings are consistent with those described by the USGS for Barnstable Outwash Plain Deposits (Oldale, 1974). Bedrock was not encountered in any of the soil borings. The location of the soil borings and monitoring wells are indicated on Figures 3, 11 and 13. Soil boring logs are included in Appendix B.

4.3.3 Bedrock Characteristics

Pursuant to 310 CMR 40.0835(4)(d)3c, a discussion of bedrock type and characteristics, depths and contours is set forth below.

As indicated above, bedrock was not encountered in any of the soil borings and is expected to be located at a depth greater than 125 feet below grade.

4.3.4 Potential for Flooding

Pursuant to 310 CMR 40.0835(4)(d)3d, an evaluation and description of the potential for flooding is set forth below.
According to the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map, the Airport is within Zone X, an area of minimal flood hazard determined to be outside the 500-year flood (Figure 15). The Airport property is not at a high risk for flooding. A small amount of forested area near Mary Dunn Pond, within the Airport property boundary, is within an area with a 0.2% annual chance of flood hazard. Refer to Figure 15 for a depiction of FEMA flood zones at and within proximity to the Airport.

5.0 ENVIRONMENTAL FATE AND TRANSPORT

Pursuant to 310 CMR 40.0835(4)(e), environmental fate and transport of OHM detected at the Disposal Site is set forth below.

5.1 Fate and Transport Characteristics

Pursuant to 310 CMR 40.0835(4)(e)1, an evaluation of the environmental fate and transport characterizes of the OHM identified at the Disposal Site, including, without limitation, mobility, stability, volatility, persistence and bioaccumulation potential of the OHM is set forth below. The OHM includes details on all six PFAS compounds regulated by the MassDEP and 1,4-dioxane.

5.1.1 Vapor Pressure

Vapor pressure is a measurement of the tendency of a material to change into the gaseous or vapor state. The higher the vapor the pressure, the more volatile a substance is. According to the EPA CompTox Chemical Database Experimental/Predicted Average ("EPA Comp Tox"), the following vapor pressures are applicable to the six PFAS compounds regulated by MassDEP and 1,4-dioxane:

Analyte	Vapor Pressure (millimeters of mercury)
Perfluorodecanoic Acid (PFDA)	$1.53x10^{-3}$
Perfluoroheptanoic Acid (PFHpA)	0.229
Perfluorohexanesulfonic Acid (PFHxS)	$8.10x10^{-9}$
Perfluorooctanoic Acid (PFOA)	0.952
Perfluorooctanesulfonic Acid (PFOS)	$2.48x10^{-6}$
Perfluorononanoic Acid (PFNA)	$8.72x10^{-3}$

Analyte	Vapor Pressure (millimeters of mercury)
1,4-dioxane	38.1

5.1.2 Henry's Law Constant

The Henry's Law Constant describes the air-water partitioning of a gas dissolved in a liquid. Compounds with high Henry's Law Constants prefer to exist in the vapor phase rather than the dissolved phase. According to the EPA CompTox, the following Henry's Law Constants are applicable to the six PFAS compounds regulated by MassDEP and 1,4-dioxane:

Analyte	Henry's Law Constant (atm-m^3/mole)
PFDA	$1.50x10^{-10}$
PFHpA	$2.09x10^{-10}$
PFHxS	$1.94x10^{-10}$
PFOA	$1.92x10^{-10}$
PFOS	$1.80x10^{-11}$
PFNA	$1.18x10^{-9}$
1,4-dioxane	$4.80x10^{-6}$

5.1.3 Solubility

The solubility of a substance is the degree to which the substance (the solute) will dissolve into a solvent (i.e., water). The higher the solubility, the more solute will dissolve into the solvent. According to the EPA CompTox, the following solubility are applicable to the six PFAS compounds regulated by MassDEP and 1,4-dioxane:

Analyte	Solubility (moles per liter)
PFDA	$5.25x10^{-3}$
PFHpA	0.324
PFHxS	$6.08x10^{-4}$
PFOA	$1.37x10^{-2}$
PFOS	$1.13x10^{-3}$
PFNA	$2.80x10^{-3}$
1,4-dioxane	11.42

5.1.4 Persistence

The persistence of a chemical is the length of time that a chemical can exist in the environment before being destroyed or transformed by natural processes. According to the EPA, a chemical is characterized as persistent if it has a half-life greater than two days. According to the EPA CompTox, the following biodegradation half-life is applicable to the six PFAS compounds regulated by MassDEP and 1,4-dioxane:

Analyte	Biodegradation Half Life (days)
PFDA	4.94
PFHpA	4.47
PFHxS	4.45
PFOA	4.94
PFOS	4.92
PFNA	4.94
1,4-dioxane	9.36

5.1.5 Bioaccumulation Potential

The bioaccumulation factor ("BCF") is an indication of the potential for a compound to bioaccumulate in the environment. The higher the BCF, the more likely it is to bioaccumulate. According to the EPA, a chemical is characterized as bioaccumulative if it has a BCF factor greater than 1,000. A chemical with a BCF greater than 5,000 is considered very bioaccumulative.

Analyte	Bioaccumulation Factor (unitless)
PFDA	49.3
PFHpA	92.2
PFHxS	175
PFOA	7,670
PFOS	1,900
PFNA	165
1,4-dioxane	0.925

5.2 Migration Pathways

Pursuant to 310 CMR 40.0835(4)(e)2, identification and characterization of existing and potential migration pathways of the OHM at and from the Disposal Site, including, as appropriate, air, soil, groundwater, soil gas, preferential migration pathways such as subsurface utility lines and other subsurface void spaces, surface water, sediment, and food chain pathways are set forth below.

5.2.1 Soil Migration

Based on the concentration of PFAS detected in soil (Table 2), none of the six regulated PFAS compounds exceed the proposed Upper Concentration Limit in soil of 4,000 ug/kg. Additionally, the Airport stopped all AFFF foam testing in 2015. AFFF use will only occur at the Airport in the event of an emergency. Also, as indicated on Figure 3, two impermeable caps were installed in September 2020 over a majority of the known PFAS in soil source area to reduce the potential for infiltration and migration. As indicated above, 1,4-Dioxane does not appear to be attributed to the Airport and a source in soil has not been identified.

5.2.2 Groundwater Migration

Based on the concentration of PFAS detected in groundwater (Table 3), none of the six regulated PFAS compounds exceed the proposed Upper Concentration Limit in groundwater of 5,000 to 100,000 ug/L. Additionally, as indicated above, two impermeable caps were installed in September 2020 over a majority of the known PFAS in soil source area to reduce the potential for infiltration and migration of PFAS in groundwater. Stormwater management systems were alco constructed in these areas to allow for stormwater to infiltrate outside of the known PFAS in soil source areas. Also, the Airport stopped all AFFF foam testing in 2015. AFFF use will only occur at the Airport in the event of an emergency.

The extent of the PFAS plume related to the use of AFFF at the Airport is indicated on Figure 2 along with the estimated extent of two other non-Airport related PFAS plumes. The vertical and horizontal extent of the PFAS plumes is also indicated on Figures 5 through 9. These figures also document that the 1,4-dioxane plume is migrating onto the Airport from an unknown source. 1,4-dioxane concentrations detected in groundwater are included on Table 4 and as indicated above, the Airport does not appear to be the source of 1,4-dioxane in groundwater.

5.2.3 Preferential Migration Pathways

No subsurface utilities or other preferential pathways are located within the Disposal Site.

5.2.4 Air and Soil Vapor Migration

Considering the depth of groundwater (greater than 15 feet), the concentration of OHM in soil and groundwater and the vapor pressures of the OHM, vapor phase migration is unlikely.

5.2.5 Surface Water and Sediment Migration Pathways

As indicated on Figure 13, surface water samples were collected from Upper Gate Pond, Lewis Pond and from a stormwater drainage basin located adjacent to the K-Mart Plaza. All results

(Table 5) were below the laboratory reporting limit and/or below the proposed Method 1 GW-1 and GW-3 Standard for the six regulated PFAS analytes. There is currently no surface water standard for PFAS. Additionally, based on the extent of the Airport's PFAS plume as indicated on Figure 13, surface water and sediments are unlikely to be impacted by the Airport AFFF release.

5.3 Potential for Groundwater to Impact Indoor Air

Pursuant to 310 CMR 40.0835(4) (e) 3, an evaluation of the potential for soil, groundwater, or NAPL to be a source of vapors of OHM to indoor air of occupied structures is set forth below.

Considering the depth of groundwater (greater than 15 feet), the concentration of OHM in soil and groundwater and the vapor pressures of the OHM, vapor phase migration into indoor air is unlikely.

6.0 NATURE AND EXTENT OF OHM IMPACT

Pursuant to 310 CMR 40.0835(4) (f), a discussion of the nature and extent of OHM impact at the disposal site is set forth below.

6.1 Characterization of Source and Nature of OHM Impact

Pursuant to 310 CMR 40.0835(4)(f), a characterization of the nature, and vertical and horizontal extent of OHM-impacts at the Disposal Site, including any and all source(s), the presence, distribution and stability of any non-aqueous phase liquid (NAPL), tabulation of analytical testing results, and, where appropriate, a characterization of background concentrations of OHM is set forth below.

As indicated above, the Disposal Site is the location of a release of PFAS compounds to soil and groundwater associated with the historic use of AFFF. The source of PFAS related to Airport operations is from the use of AFFF for training and emergencies. Annual testing per FAA regulations is required to ensure that there is the appropriate AFFF to water mixture. Historically, the test consisted of essentially shooting the mixture of AFFF from the fire rescue vehicle at a small square target. The Airport has since purchased an ecological unit to test to the AFFF mixture without the need of physically mixing or spraying the foam. AFFF usage at the Airport is limited to emergencies only and most of the known sources within the Deployment Area and ARFFF Building Area were capped in September 2020.

6.2 Extent of OHM Impact

Pursuant to 310 CMR 40.0835(4)(f), a characterization of the vertical and horizontal extent of OHM impact at the Disposal Site is indicated on Figures 2 through 14 and Tables 2 through 5. Additional details are set forth below.

The estimated horizontal extent of OHM impacts at the Airport is indicated on Figures 2 and 11 through 13. Based on the spatial distribution and extent of PFAS impacted soil and groundwater, the vertical extent of PFAS impacted media is estimated to be from ground surface to approximately 56 feet below grade. A graphical representation of the vertical and horizontal extent of PFAS is set forth on Figure 5 through 10. As indicated on Figure 2, the Airport is also being impacted with 1,4-dioxane and PFAS plumes from off-site sources.

6.3 Characterization of Background Conditions

Pursuant to 310 CMR 40.0835(4)(f), a characterization of background concentrations of OHM impact at the disposal site is set forth below.

Background levels of PFAS in soil have been detected at the Airport as well as throughout the Town of Barnstable. To determine background levels at the Airport and surrounding area, HW collected 20 soil samples (7 soil on-Airport and 13 off-airport) at the locations indicated on Figure 14. Total PFAS concentrations ranged from less than the laboratory reporting limit to 5.45 ug/kg. One of the background samples collected at the Airport exceeded the applicable Method 1 standard for PFOS while eight of the background samples collected off Airport property exceeded the applicable Method 1 soil standards for various PFAS analytes including PFOS. Tabulated analytical data is included on Table 6. It should be noted that the single exceedance from the 1991 Drill Area (1991B [0-1]) and in proximity to the Steamship Parking Lot (A10) is consistent with background and do not appear to be related to the AFFF release associated with Airport operations.

7.0 EXPOSURE ASSESSMENT

Pursuant to 310 CMR 40.0835(4) (g), an exposure assessment, including the identification and characterization of all potential human and environmental receptors that could be impacted by OHM at or migrating from the Disposal Site, and, as appropriate, the quantification of exposure of OHM-impact at the Disposal Site is set forth below.

7.1 Potential Human Receptors

Pursuant to 310 CMR 40.0835(4) (f), potential human receptors are identified and characterized below.

Human Receptors Exposed to Soil

The two PFAs release areas at the Airport (the ARFF Building and the Deployment Area) are located within restricted and secured areas were the public are not allowed access. A majority of the PFAS source areas have also been capped with either asphalt or 30-mil geomembrane. Additionally, the highest concentration of one of the six regulated PFAS compounds (100 ug/kg) detected in Airport soils is significantly less than the proposed Method 2 S-1 soil category (300 ug/kg) which is protective of a direct contact exposure. As indicated above, 1,4-dioxane has not been detected in Airport soils.

Human Receptors Exposed to Groundwater

The Airport is located within a current drinking water source area, designated as Zone II's to various public drinking water supply wells. As documented in the Phase I Report, the Airport and downgradient residential properties were confirmed to have municipally supplied drinking water. No private drinking water wells at the Airport or downgradient properties were identified by HW or the Town of Barnstable Department of Public Works, Water Supply Division, and the Town of Yarmouth Health Department. Additionally, the municipal water supplier is aware that public water supply wells have been impacted with PFAS and 1,4-dioxane. The water supplier is treating the drinking water accordingly to continue to provide drinking water to the residents that meets regulatory drinking water standards. A majority of the PFAS detected in the vicinity of the public drinking water supply wells appears to be from other non-Airport related sources including the Barnstable Fire Training Academy. As indicated above, 1,4-dioxane does not appear to be associated with a release from the Airport.

7.2 Potential Environmental Receptors

Pursuant to 310 CMR 40.0835(4) (f), potential environmental receptors are identified and characterized below.

Surface water samples collected from Upper Gate and Lewis Pond were all below the laboratory reporting limits for the six regulated PFAS analytes. The laboratory reporting limit is also less than the proposed Method 1 GW-1. No evidence of fish kills, or stressed vegetation have been detected in surface water at the Airport. Also, a majority of the PFAS source areas have been caped and access to these areas are restricted with a fence. Fishing and hunting are not allowed at the Airport. As indicated above, the release of 1,4-dioxane does not appear to be associated with the Airport.

8.0 RISK CHARACTERIZATION

Pursuant to 310 CMR 40.0900, the characterization of risk of harm to health, safety, public welfare and the environment is set forth below.

8.1 Soil Classification

Pursuant to 310 CMR 40.0933, the applicable soil category is selected based upon the frequency, intensity of use, and accessibility of the Disposal Site by adults and children. Pursuant to 310 CMR 40.0923, risk characterization shall consider current and reasonably foreseeable Disposal Site activities.

8.1.1 Frequency of Use

Frequency of use indicates how often a receptor makes use of, or has access to, the Disposal Site. The frequency is classified as either "High," "Low," or "Not Present" based on the criteria set forth in 310 CMR 40.0933(4)(a).

The Disposal Site is located within a restricted area of the Airport where access to adults is provided for work related activities. Therefore, the frequency of use for adults is considered "high".

8.1.2 Intensity of Use

The intensity of use is based on the kind of activities and uses that occur at a Disposal Site and are classified as either "High" or "Low." Pursuant to 310 CMR 40.0933(4)(b)(1), Site activities and uses which have potential to disturb soil and thus result in either direct contact with the soil itself or inhalation of soil-derived dust shall be characterized as high intensity use.

Based upon the current use, passive activities which do not disturb the soil, such as walking and driving, are likely to occur in the area. As such, the intensity of use would be considered "low".

8.1.3 Accessibility

Soils are classified as "Accessible," "Potentially Accessible" and "Isolated" based upon the depth to OHM impact and the presence of impervious material, if any. Pursuant to 310 CMR 40.0933(4)(c) impacted soils located within the first three feet of the surface in unpaved areas would be considered "Accessible." Soils from three to 15 feet below grade in unpaved areas, or soils from less than fifteen feet below grade in paved areas, would be considered "Potentially Accessible." Soils greater than 15 feet below grade or beneath the footprint of a building would be considered as "Isolated". Therefore, soils at the Disposal Site are considered "accessible".

8.1.4 Disposal Site Specific Soil Classification

Pursuant to 310 CMR 40.0933(9), the appropriate soil classification for a Disposal Site with "high" frequency and "low" intensity of use for adults (foreseeable future uses) and where impacted soils are "Accessible" soils are classified as S-2. However, as a conservative measure, soils at the Airport will be compared to the S-1 standards.

8.2 Groundwater Classification

Pursuant to 40.0932, groundwater classification is based on several factors including the current and potential use as a drinking water source, proximity to buildings and ecological risks. Groundwater is organized into three categories: GW-1, GW-2 and GW-3.

1. The GW-1 classification applies to groundwater located within a current or potential drinking water source area. The Method 1 GW-1 Standards address potential exposure to drinking impacted groundwater.
2. The GW-2 classification applies to groundwater located within 30 feet of an existing or planned building and where the average annual depth to groundwater is 15 feet or less. The Method 1 GW-2 Standards address potential exposure to vapors collecting in buildings above or adjacent to impacted groundwater.
3. The GW-3 classification applies to all groundwater that can potentially impact surface water bodies. Pursuant to 310 CMR 40.0932(2), all groundwater is considered a potential source of discharge to a surface water body. Therefore, the GW-3 classification applies to all groundwater within the boundaries of the Commonwealth of Massachusetts.

8.2.1 Disposal Site Specific Groundwater Classification

- As set forth above, the Disposal Site is located within a drinking water source area. Therefore, the GW-1 groundwater classification is applicable to groundwater at the Disposal Site.
- As indicated on Table 3, groundwater in the vicinity of structures at the Airport are located at a depth greater than 15 feet below grade. Therefore, the GW-2 classification is not applicable to the Disposal Site.
- As set forth above, the GW-3 classification is applicable to all the groundwater located within the boundaries of the Commonwealth of Massachusetts. Therefore, the GW-3 groundwater classification is also applicable to the Disposal Site.

8.3 Method 1 Risk Characterization

Pursuant to 310 CMR 40.0973(7), a condition of *No Significant Risk* (“NSR”) of harm to health, safety, public welfare and the environment exists if no soil or groundwater Exposure Point Concentration (“EPC”) is greater than the applicable MCP Method 1 Soil and Groundwater Standards. A Method 1 Risk Characterization was conducted to assess risk to human health, safety, public welfare and the environment associated with the release of OHM at the Airport as set forth below.

8.3.1 Risk Posed by OHM Impacted Soil

As set forth in in Table 2, concentrations of PFAS were reported above applicable Method 1 S-1 Soil Standards. No compounds were detected in soil in excess of upper concentration limits ("UCLs"). Therefore, a level of NSR has not been achieved at the Disposal Site with respect to OHM-impacted soil.

8.3.2 Risk Posed by OHM Impacted Groundwater

As set forth in Tables 3 and 4, concentrations of PFAS and 1,4-dioxane were reported above the applicable Method 1 GW-1 Groundwater Standards. No compounds were detected in groundwater in excess of the GW-3 Standard or UCLs. Therefore, a level of NSR has not been achieved for the Disposal Site with respect to OHM-impacted groundwater.

9.0 CONCEPTUAL SITE MODEL

- The Disposal Site is located within a MassDEP designated Zone II to the Maher municipal drinking water wells and within a Medium-Yield Sole Source Aquifer. Due to development of the surrounding areas, a large portion of the Zone II that the Airport is located within is also designated as a non-potential drinking water source area (NPDWSA) as indicated on Figure 16.
- The source of PFAS related to Airport operations is from the use of AFFF for training and emergencies. Personnel working at the Airport since 1980 were consulted to determine when AFFF use occurred for training purposes or during an actual aircraft accident at the Airport. Three locations included the Deployment Area, the ARFF Building Area and the 1991 Drill Area were identified. Subsequent testing of these areas identified the Deployment and ARFF Building Area as the source of AFFF detected in soil and groundwater.
- In 2016 the Airport purchased an Ecologic Cart system to prevent the discharge of firefighting foam on the ground surface during testing. The Ecologic Cart allows the Airport to test the fire truck's ability to properly mix and dispense foam actually mixing or dispersing the AFFF. This unit was the first unit purchased for any Massachusetts airport and well before final FAA testing and approval for universal use at airports. The Airport discontinued testing with AFFF in 2016.
- Between 2000 and 2016, approximately 56,000-gallons of water mixed with approximately 1,680 gallons of AFFF concentrate were used in the Deployment Area for testing and drills. Based on purchase records, Chem-Guard 3% mil-spec AFFF was used during all training events.
- In October 2017, 20 surface samples were collected both on and off Airport property to determine the background concentration of PFAS in the area not related to the application of AFFF. This study verified that PFAS detected in soil above the proposed Method 1 soil standard at sample locations A10 (Steamship Parking Lot) and 1991B (1991 Drill Location) are consistent with background and not related to the use of AFFF.

- Radar plots generated for each of the groundwater monitoring wells tested both on and off Airport property identified 6:2 FTS as a distinguishing analyte used to determine if the PFAS impacted groundwater downgradient of the Airport was related to the Airport's AFFF usage or from another off-site source. As indicated on Figure 2, PFAS impacted groundwater is migrating onto the Airport from upgradient sources that is not consistent with the PFAS plume associated with Airport. Additionally, 6:2 FTS does not degrade into PFOS or PFHxS. Please refer to page 8 for a detailed description of Radar Plots.
- Monitoring wells installed hydraulically upgradient of the Airport identified 1,4-dioxane in groundwater. Based on substantial testing both on and off the Airport, the source of 1,4-dioxane that is impacting both the Airport and the Maher wells appears to be related to an off-site source.
- Groundwater velocity was calculated at 5.63 to 111.71 feet per year. Assuming the release has occurred for 20 years and that the plume has migrated at the maximum velocity with no PFAS retardation, the maximum extent of the plume appears to be consistent with the maximum estimated extent of the Airport's AFFF PFAS depicted on Figure 2. It should be noted that radar plots were used to determine if the PFAS detected in a particular well was associated with the Airports AFFF release of from other non-Airport related PFAS sources.
- The results of the Phase II are based on the collection and laboratory analysis of the following:
    - 121 soil samples for laboratory analysis of PFAS;
    - Three surface water samples for laboratory analysis of PFAS;
    - 101 groundwater samples for laboratory analysis of PFAS; and
    - 41 groundwater samples for laboratory analysis of 1,4-dioxane.

10.0 PUBLIC INVOLVEMENT

Pursuant to 310 CMR 40.1403 and the Final PIP dated September 16, 2019, notification of the Phase II will be provided to all individuals on Table 1. This includes the Chief Municipal Officer and the Board of Health for both Barnstable and Yarmouth.

FIGURES

1- USGS Locus
2- Disposal Site Map
3- Soil Sample Locations
4- Hydrogeologic Cross Section Plan
5- Hydrogeologic Cross Section 1
6- Hydrogeologic Cross Section 1 Radar Plots
7- Hydrogeologic Cross Section 2
8- Hydrogeologic Cross Section 2 Radar Plots
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11- 1,4-Dioxane Results in Groundwater
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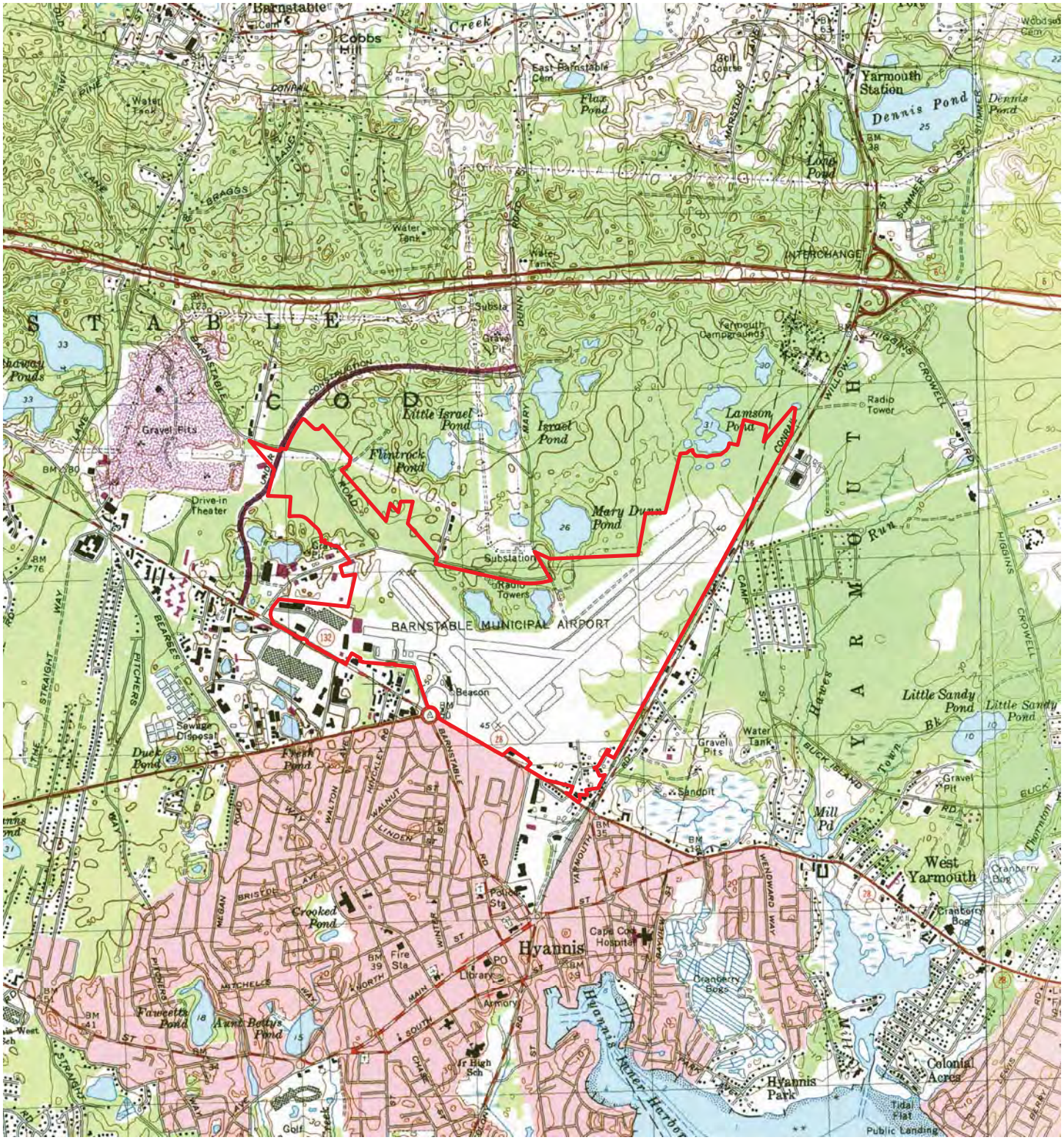
16 - Priority Resource Map



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Legend

Airport Property Line

*Hyannis Topographic Quadrangle

N

Miles

0.5

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USGS Locus
Barnstable Municipal Airport
Hyannis, MA

Date: 4/17/2018

Figure 1

GP-2
GP-5
Flint Rock Pond
Barnstable Fire Training Academy
Israel Pond
MD-4
MD-3
MD-2
MD-1
Lamson Pond
Mary Dunn Pond
Off-Site BFTA PFAS Plume Impacting Airport and Others
Off-Site PFAS Plume Impacting Airport and Others
1991 Drill Location
1981 Crash Site
Air-1
Upper Gate Pond
Lewis Pond
Estimated Disposal Site Boundary
Yarmouth Road
Deployment Area
ARFF Area
Off-Site 1,4-Dioxane Plume Impacting Airport and Others
Barnstable Road
ME-3
ME-1
ME-2
32
30
28
26
24
22
20
18
16
14
132
28

Legend

- Airport Monitoring Wells
- Barnstable Fire Training Academy Monitoring Wells
- Soil Samples
- Surface Water Samples Completed by Airport
- Drinking Water Wells
- Barnstable Municipal Airport Property Boundary
- Estimated Disposal Site Boundary for Airport AFFF Release
- Groundwater Contours
- Estimated Extent of Airport AFFF PFAS Plume
- Estimated Extent of Off-Site BFTA Plume
- Estimated Extent of Off-Site 1,4-Dioxane Plume
- Estimated Extent of Off-Site 1,4-Dioxane Plume

N

0 750

1 in = 750 feet

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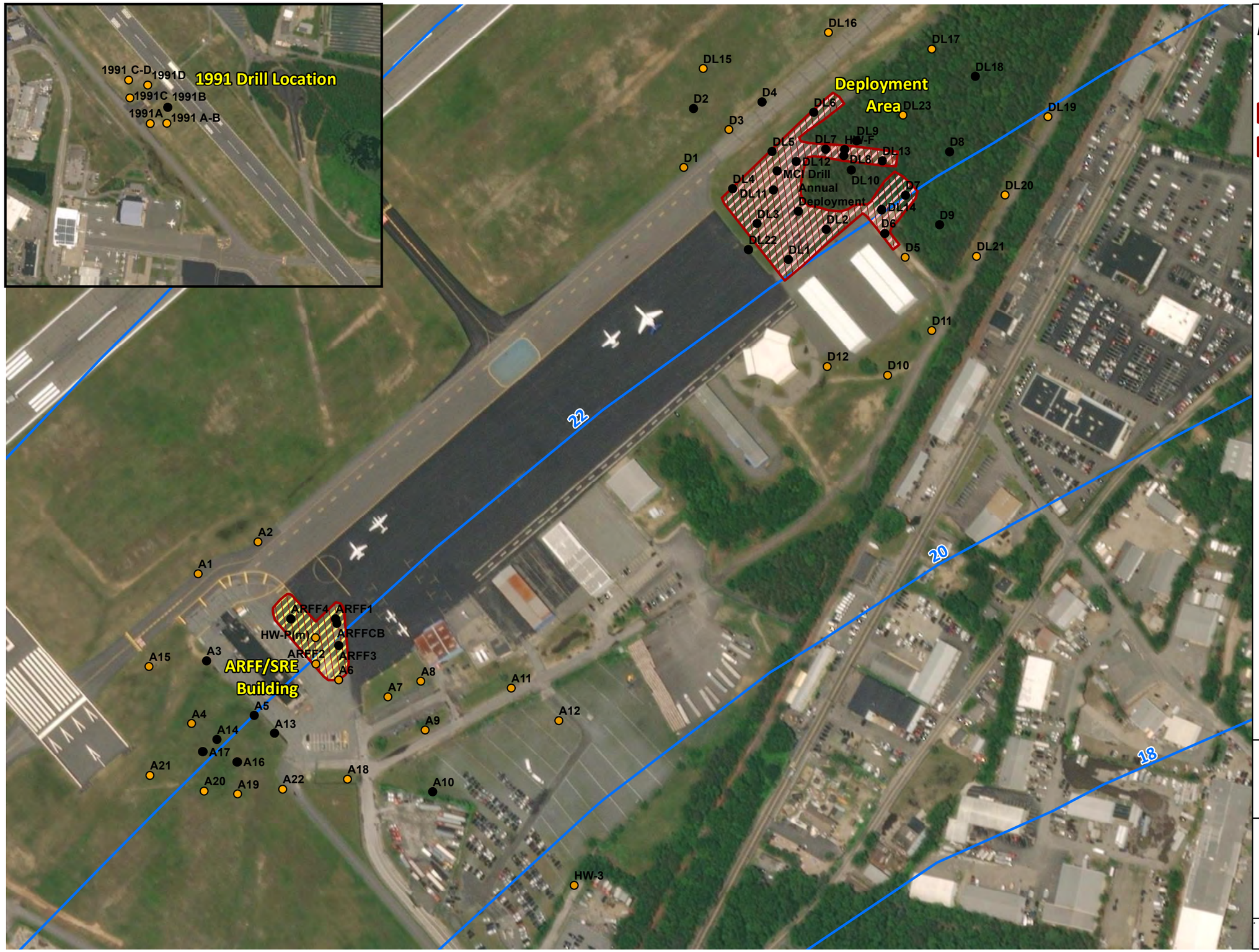
Disposal Site Map
Barnstable Municipal Airport
Hyanis, MA

Date: 12/2/2020

Figure 2

* Cape Cod Commission (CCC) Groundwater Contours

Path: H:\Projects\HYA\17027 BMA PFOS 1-4 IRA\GIS\Maps\Disposal Site Map.mxd



Legend

- Groundwater Contours*
- Deployment Area Liner Cap
- ARFF Asphalt Cap
- Soil Sample Location Below Method 1 S-1/GW-1 Standard for all Six PFAS Compounds
- Soil Sample Exceeds Method 1 S-1/GW-1 Standard for at least one of the six PFAS compounds

Proposed Method 1 S-1/GW-1 Standard
PFHpA = 0.5 ug/kg
PFHxS = 0.3 ug/kg
PFOA = 0.72 ug/kg
PFNA = 0.32 ug/kg
PFOS = 2 ug/kg
PFDA = 0.3 ug/kg

N

0 225

1 in = 225 feet

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Soil Sample Locations
Barnstable Municipal Airport
Hyannis, MA

Date: 11/18/2020 Figure 3

** Cape Cod Commission (CCC) Groundwater Contours*

CROSS SECTION 1

CROSS SECTION 2

CROSS SECTION 3

BARNSTABLE FIRE TRAINING ACADEMY (BFTA)

PC-4 (BFTA MONITORING WELL)

PC-11 (BFTA MONITORING WELL)

PC-18 (BFTA MONITORING WELL)

PFW-2 (BFTA MONITORING WELL)

PC-1 (BFTA MONITORING WELL)

GROUNDWATER CONTOUR*

32

30

28

26

24

22

20

18

16

14

AIRPORT PROPERTY LINE

HW-D(M)
HW-D(D)
HW-D(DD)

HW-V(M)

HW-A(S)

HW-1

HW-4(M)

HW-23

HW-19(D)

HW-F

AFFF DEPLOYMENT LOCATION

AFFF/SRE BUILDING

HW-I(S)
HW-I(M)
HW-I(D)

HW-P(S)
HW-P(M)

HW-302

HW-S(S)
HW-S(M)

HW-3

HW-K

OW-18(S)
OW-18(M)
OW-18(D)

HW-L(S)
HW-L(M)
HW-L(D)

ME-3 (MAHER MUNICIPAL WELL)

RB-1(S)
RB-1(M)

OW-9(S)
OW-9(M)
OW-9(D)
OW-9(DD)

ME-2 (MAHER MUNICIPAL WELL)

ME-1 (MAHER MUNICIPAL WELL)

GRAPHIC SCALE

500 0 250 500 1000

(in feet)

1 INCH = 750 FEET

*GROUNDWATER CONTOURS PROVIDED BY CAPE COD COMMISSION

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Date: DEC 2020

Plan Set: HYDROLOGIC CROSS SECTION
BARNSTABLE MUNICIPAL AIRPORT
HYANNIS, MASSACHUSETTS

Plan Title: PLAN - FIGURE 4

Prepared For:
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480 BARNSTABLE ROAD
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Phone: ---
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Registration:

Project Number: 17027

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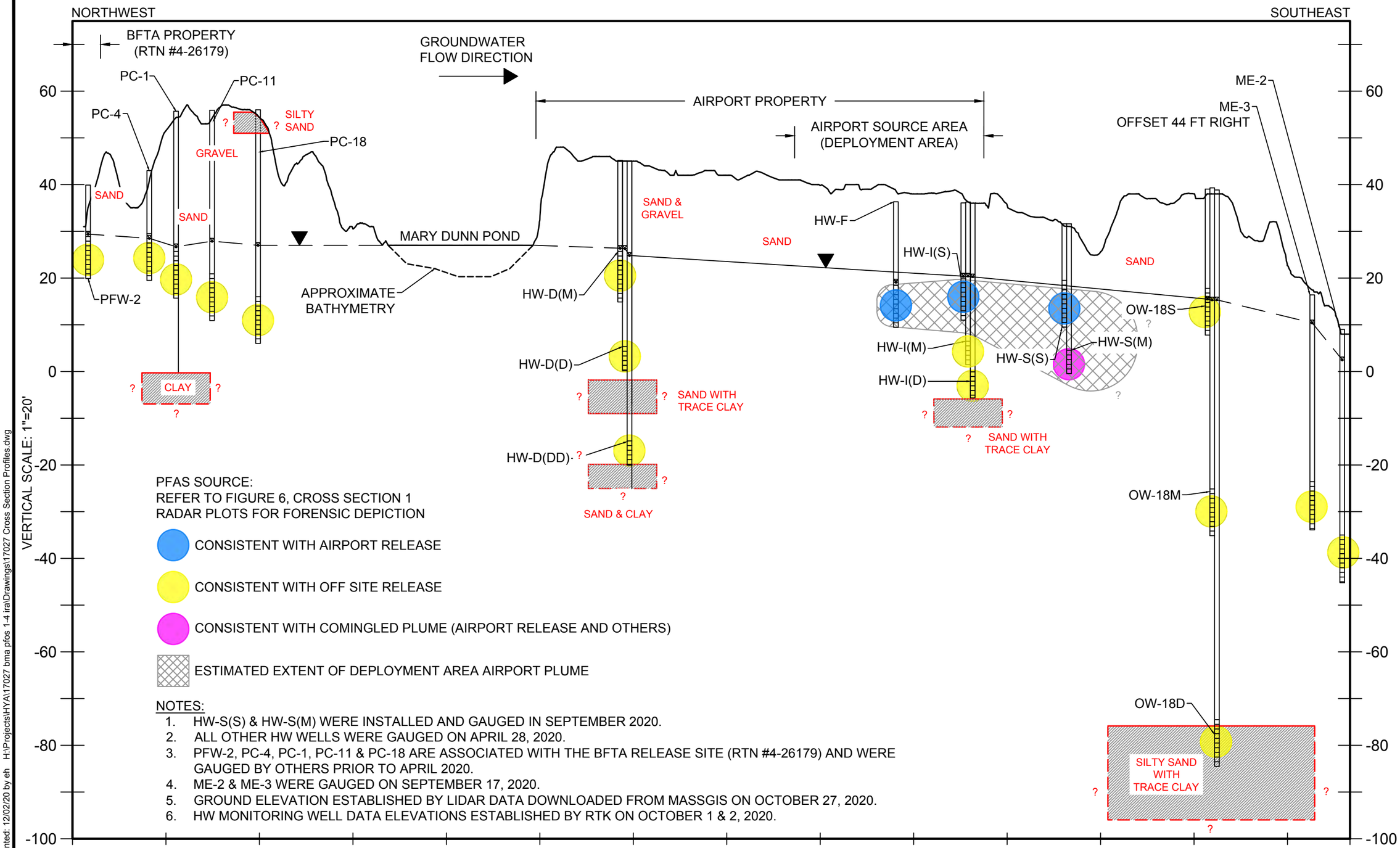

PFAS SOURCE:
REFER TO FIGURE 6, CROSS SECTION 1
RADAR PLOTS FOR FORENSIC DEPICTION

CONSISTENT WITH AIRPORT RELEASE

CONSISTENT WITH OFF SITE RELEASE

CONSISTENT WITH COMINGLED PLUME (AIRPORT RELEASE AND OTHERS)

ESTIMATED EXTENT OF DEPLOYMENT AREA AIRPORT PLUME

NOTES:

1. HW-S(S) & HW-S(M) WERE INSTALLED AND GAUGED IN SEPTEMBER 2020.
2. ALL OTHER HW WELLS WERE GAUGED ON APRIL 28, 2020.
3. PFW-2, PC-4, PC-1, PC-11 & PC-18 ARE ASSOCIATED WITH THE BFTA RELEASE SITE (RTN #4-26179) AND WERE GAUGED BY OTHERS PRIOR TO APRIL 2020.
4. ME-2 & ME-3 WERE GAUGED ON SEPTEMBER 17, 2020.
5. GROUND ELEVATION ESTABLISHED BY LIDAR DATA DOWNLOADED FROM MASSGIS ON OCTOBER 27, 2020.
6. HW MONITORING WELL DATA ELEVATIONS ESTABLISHED BY RTK ON OCTOBER 1 & 2, 2020.

CROSS SECTION 1 PROFILE

HORIZONTAL SCALE: 1"=600'

Revisions

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Plan Set: HYDROLOGIC CROSS SECTION
BARNSTABLE MUNICIPAL AIRPORT
HYANNIS, MASSACHUSETTS

Plan Title: CROSS SECTION 1 - FIGURE 5

Prepared For:
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MUNICIPAL AIRPORT
480 BARNSTABLE ROAD
HYANNIS, MA 02601

Registration:

Project Number: 17027

Sheet Number: 2 of 7

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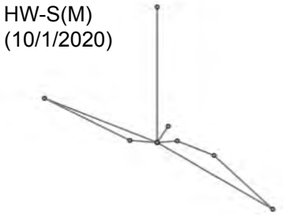
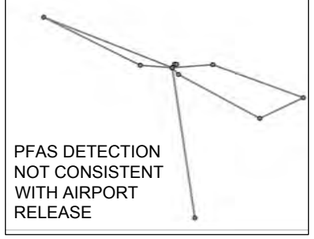
PFW-2 (3/30/2016) PFAS DETECTION RELATED TO BFTA RELEASE	PC-4 (3/8/2016) PFAS DETECTION RELATED TO BFTA RELEASE	PC-1 (3/3/2016) PFAS DETECTION RELATED TO BFTA RELEASE	PC-11 (5/12/2016) PFAS DETECTION RELATED TO BFTA RELEASE	PC-18 (6/17/2015) PFAS DETECTION RELATED TO BFTA RELEASE
HW-D(M) (5/13/2020) PFAS DETECTION CONSISTENT WITH BFTA RELEASE	HW-F (5/5/2020) PFAS DETECTION CONSISTENT WITH AIRPORT RELEASE	HW-I(S) (5/8/2020) PFAS DETECTION CONSISTENT WITH AIRPORT RELEASE	HW-S(S) (10/1/2020) PFAS DETECTION CONSISTENT WITH AIRPORT RELEASE	OW-18(S) (5/8/2020) PFAS DETECTION NOT CONSISTENT WITH AIRPORT RELEASE
HW-D(D) (5/13/2020) PFAS DETECTION CONSISTENT WITH BFTA RELEASE		HW-I(M) (5/8/2020) PFAS DETECTION CONSISTENT WITH BFTA RELEASE	HW-S(M) (10/1/2020)  PFAS DETECTION CONSISTENT WITH COMINGLED PLUME	OW-18(M) (5/8/2020) PFAS DETECTION NOT CONSISTENT WITH AIRPORT RELEASE
HW-D(DD) (5/13/2020) PFAS DETECTION CONSISTENT WITH BFTA RELEASE		HW-I(D) (5/8/2020) PFAS DETECTION CONSISTENT WITH BFTA RELEASE		OW-18(D) (5/13/2020)  PFAS DETECTION NOT CONSISTENT WITH AIRPORT RELEASE
ME-3 (9/17/2020) PFAS DETECTION CONSISTENT WITH BFTA RELEASE	ME-2 (9/17/2020) PFAS DETECTION CONSISTENT WITH BFTA RELEASE			

NOTE:

REFER TO APPEDIX A FOR RADAR PLOTS WITH ANALYTICS AND NORMALIZED PFAS DATA.

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Plan Set: HYDROLOGIC CROSS SECTION
BARNSTABLE MUNICIPAL AIRPORT
HYANNIS, MASSACHUSETTS

Plan Title: CROSS SECTION 1 RADAR PLOTS - FIGURE 6

Prepared For:
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MUNICIPAL AIRPORT
480 BARNSTABLE ROAD
HYANNIS, MA 02601

Registration:

Project Number: 17027

Sheet Number: 3 of 7

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NORTHWEST

SOUTHEAST

AIRPORT PROPERTY

HW-V(M)
OFFSET 60 FT RIGHT

HW-A(S)

HW-1

HW-4(M)

HW-19(D)

HW-23

GROUNDWATER
FLOW DIRECTION

ME-1

HW-L(S)

HW-L(M)

OW-9(S)

OW-9(M)

OW-9(D)

OW-9(DD)

HW-L(D)

SAND WITH GRAVEL

SAND WITH GRAVEL

SAND WITH GRAVEL

SAND WITH GRAVEL

CLAY

?

VERTICAL SCALE: 1"=20'

60
40
20
0
-20
-40
-60
-80
-100

0+00
12+00
24+00
36+00
48+00
60+00
72+00
77+91

PFAS SOURCE:
REFER TO FIGURE 8, CROSS SECTION 2
RADAR PLOTS FOR FORENSIC DEPICTION

CONSISTENT WITH AIRPORT RELEASE

CONSISTENT WITH OFF SITE RELEASE

CONSISTENT WITH COMINGLED PLUME (AIRPORT RELEASE AND OTHERS)

ESTIMATED EXTENT OF 1,4-DIOXANE PLUME

NOTES:

1. HW-V(M), HW-L(S) & HW-L(M) WERE INSTALLED AND GAUGED IN SEPTEMBER 2020.
2. HW-A(S) COULD NOT BE LOCATED AND WAS LAST GAUGED IN 2017.
3. ALL OTHER HW WELLS WERE GAUGED ON APRIL 28, 2020.
4. GROUND ELEVATION ESTABLISHED BY LIDAR DATA DOWNLOADED FROM MASSGIS ON OCTOBER 27, 2020.
5. HW MONITORING WELL DATA ELEVATIONS ESTABLISHED BY RTK ON OCTOBER 1 & 2, 2020.

CROSS SECTION 2 PROFILE

HORIZONTAL SCALE: 1"=600'

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Plan Set:
HYDROLOGIC CROSS SECTION
BARNSTABLE MUNICIPAL AIRPORT
HYANNIS, MASSACHUSETTS

Plan Title:
CROSS SECTION 2 - FIGURE 7

Prepared For:
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480 BARNSTABLE ROAD
HYANNIS, MA 02601

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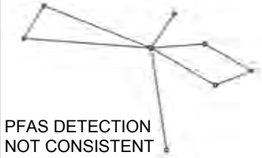
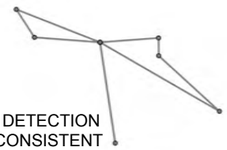
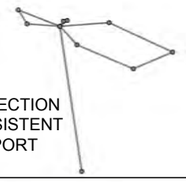
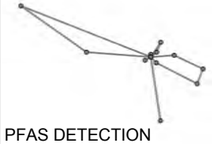
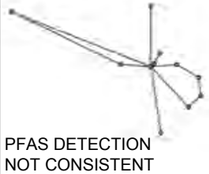
HW-V(M) (10/2/2020) PFAS DETECTION NOT CONSISTENT WITH AIRPORT RELEASE	HW-A(s) (4/7/2017) PFAS DETECTION NOT CONSISTENT WITH AIRPORT RELEASE	HW-1 (11/1/2018)  PFAS DETECTION NOT CONSISTENT WITH AIRPORT RELEASE	HW-4(M) (4/5/2017) PFAS DETECTION NOT CONSISTENT WITH AIRPORT RELEASE	HW-19(D) (11/7/2018) PFAS DETECTION NOT CONSISTENT WITH AIRPORT RELEASE

HW-23 (11/1/2018)  PFAS DETECTION NOT CONSISTENT WITH AIRPORT RELEASE	HW-L(S) (10/7/2020) PFAS DETECTION NOT CONSISTENT WITH AIRPORT RELEASE	OW-9(S) (5/8/2020)  PFAS DETECTION NOT CONSISTENT WITH AIRPORT RELEASE	ME-1 (9/17/2020) PFAS DETECTION NOT CONSISTENT WITH AIRPORT RELEASE

	HW-L(M) (10/7/2020) PFAS DETECTION NOT CONSISTENT WITH AIRPORT RELEASE	OW-9(M) (5/8/2020) PFAS DETECTION NOT CONSISTENT WITH AIRPORT RELEASE
	HW-L(D) (10/7/2020)  PFAS DETECTION NOT CONSISTENT WITH AIRPORT RELEASE	OW-9(D) (5/5/2020) PFAS DETECTION NOT CONSISTENT WITH AIRPORT RELEASE
		OW-9(DD) (10/2/2020)  PFAS DETECTION NOT CONSISTENT WITH AIRPORT RELEASE

NOTE:

REFER TO APPEDIX A FOR RADAR PLOTS WITH ANALYTICS AND NORMALIZED PFAS DATA.

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Date: DEC 2020

Plan Set: HYDROLOGIC CROSS SECTION
BARNSTABLE MUNICIPAL AIRPORT
HYANNIS, MASSACHUSETTS

Plan Title: CROSS SECTION 2 RADAR PLOTS - FIGURE 8

Prepared For:
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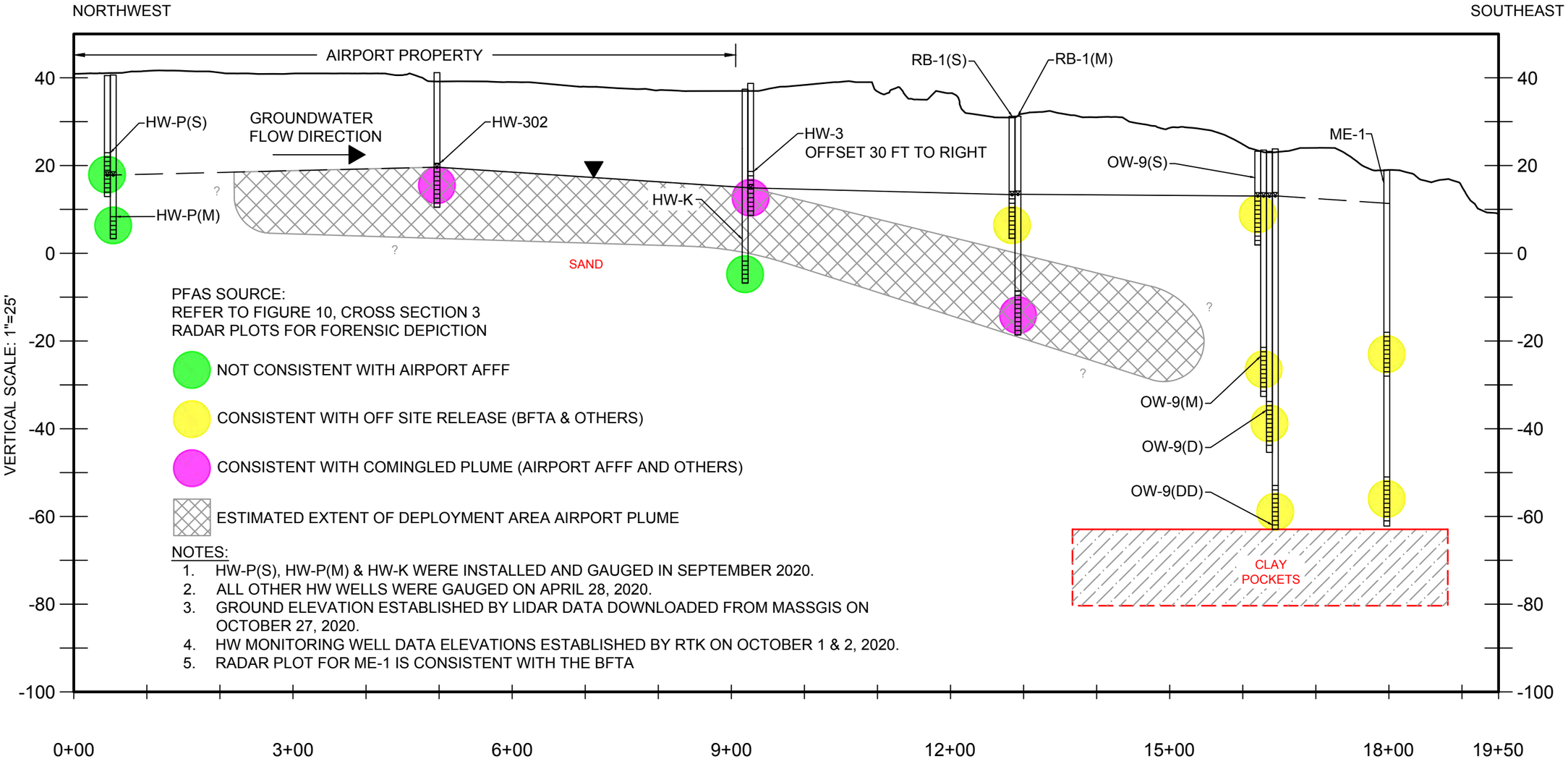
MUNICIPAL AIRPORT
480 BARNSTABLE ROAD
HYANNIS, MA 02601
Phone: ----
Fax: ----

Registration:

Project Number: 17027

Sheet Number: 5 of 7



CROSS SECTION 3 PROFILE

HORIZONTAL SCALE: 1"=150'

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Design By: N/A
Date: DEC 2020

Plan Set: HYDROLOGIC CROSS SECTION
BARNSTABLE MUNICIPAL AIRPORT
HYANNIS, MASSACHUSETTS

Plan Title: CROSS SECTION 3 - FIGURE 9

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Phone: (508) 833-6600
Fax: (508) 833-3150

Registration:

Project Number: 17027

Sheet Number: 6 of 7

HW-P(S)
(10/1/2020)

PFAS DETECTION NOT CONSISTENT WITH AIRPORT RELEASE

HW-302
(12/3/2018)

PFAS DETECTION CONSISTENT WITH COMINGLED PLUME

HW-K
(5/21/2020)

PFAS DETECTION NOT CONSISTENT WITH AIRPORT RELEASE

HW-3
(5/5/2020)

PFAS DETECTION CONSISTENT WITH COMINGLED PLUME

RB-1(S)
(11/5/2020)

PFAS DETECTION NOT CONSISTENT WITH AIRPORT RELEASE

OW-9(S)
(5/8/2020)

PFAS DETECTION NOT CONSISTENT WITH AIRPORT RELEASE

ME-1
(9/17/2020)

PFAS DETECTION NOT CONSISTENT WITH AIRPORT RELEASE

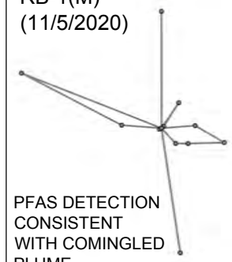
HW-P(M)
(10/1/2020)

PFAS DETECTION NOT CONSISTENT WITH AIRPORT RELEASE

NOTE:

REFER TO APPEDIX A FOR RADAR PLOTS WITH ANALYTICS AND NORMALIZED PFAS DATA.

RB-1(M)
(11/5/2020)



PFAS DETECTION CONSISTENT WITH COMINGLED PLUME

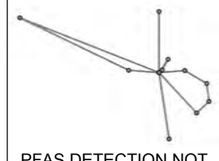
OW-9(M)
(5/8/2020)

PFAS DETECTION NOT CONSISTENT WITH AIRPORT RELEASE

OW-9(D)
(5/5/2020)

PFAS DETECTION NOT CONSISTENT WITH AIRPORT RELEASE

OW-9(DD)
(10/2/2020)



PFAS DETECTION NOT CONSISTENT WITH AIRPORT RELEASE

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Date: DEC 2020

Plan Set:
HYDROLOGIC CROSS SECTION
BARNSTABLE MUNICIPAL AIRPORT
HYANNIS, MASSACHUSETTS

Plan Title:
CROSS SECTION 3 RADAR PLOTS - FIGURE 10

Prepared For:
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480 BARNSTABLE ROAD
HYANNIS, MA 02601

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Project Number:
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Sheet Number:
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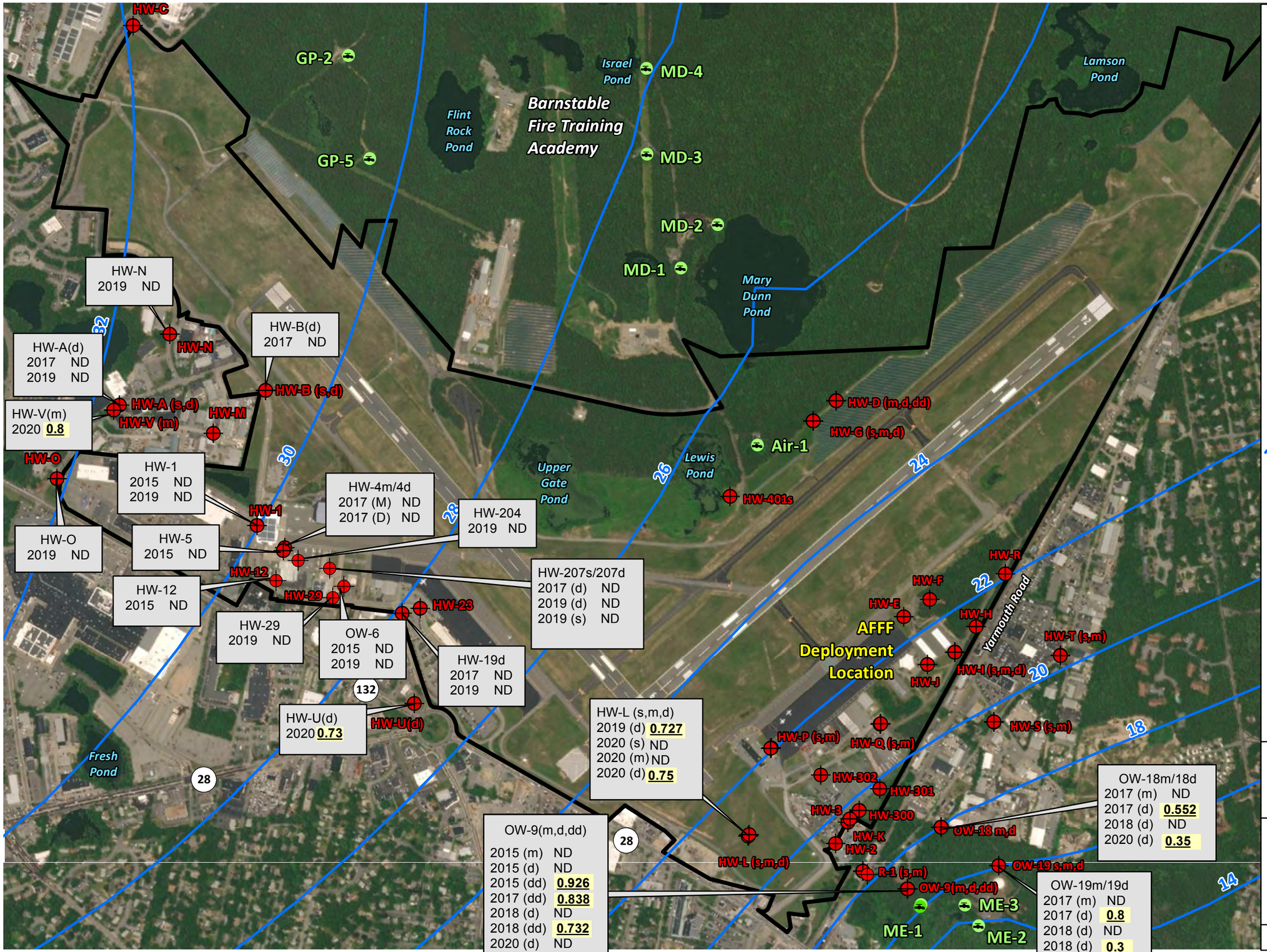

Legend

- Monitoring Wells
- ND — Not detected by the laboratory above the reporting limit
- 0.2 — 1,4 Dioxane Below MassDEP Limit (0.3 ug/L)
- **0.8** — 1,4 Dioxane Above Method 1 GW-1 Standard (0.3 ug/L)
- Drinking Water Wells
- Barnstable Municipal Airport Property Boundary
- Groundwater Contours

N

0 750

1 inch = 750 feet

Horsley Witten Group
Sustainable Environmental Solutions
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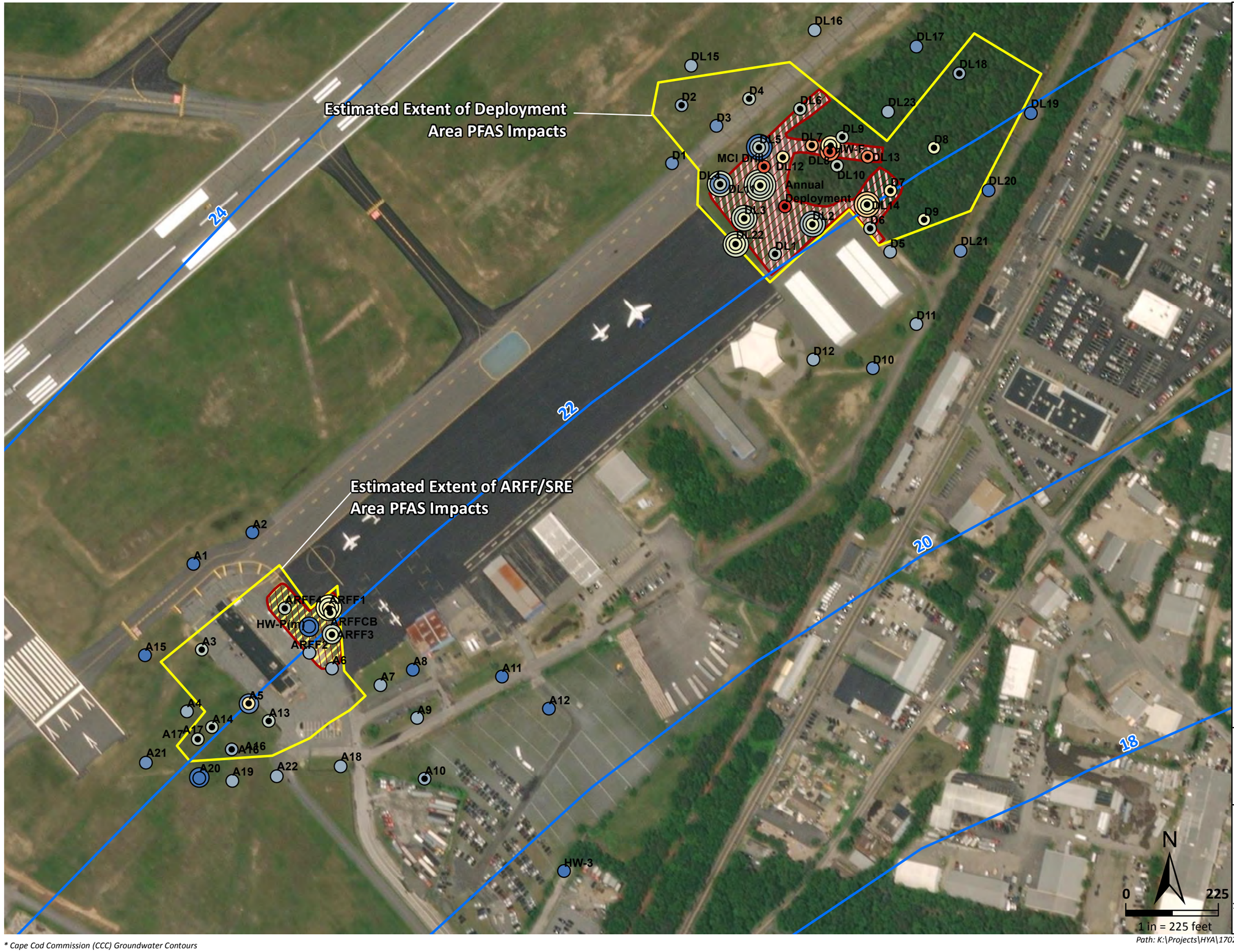
1,4 Dioxane Results In Groundwater Barnstable Municipal Airport Hyannis, MA

Date: 12/2/2020

Figure 11

Path: H:\Projects\HYA\17027 BMA PFOS 1-4 IRA\GIS\Maps\200408_DioxaneMap.mxd



Legend

- Groundwater Contours*
- Samples exceeding MassDEP S-1/GW-1 Standard
- ARFF Asphalt Cap
- Deployment Area Liner Cap

Maximum Concentration of Total PFAS Detected in Soil (ug/kg)

- 0 - 0.5
- 0.5 - 1
- 1 - 5
- 5 - 20
- 20 - 100
- 100 - 200
- 200 - 500
- 500 - 1000
- 1000 - 2000
- 2000 - 6000

Notes:
1. Multiple circles indicates samples at different depths. The larger the circle, the deeper the sample.

2. Total PFAS is the sum of all laboratory reported PFAS analytes.

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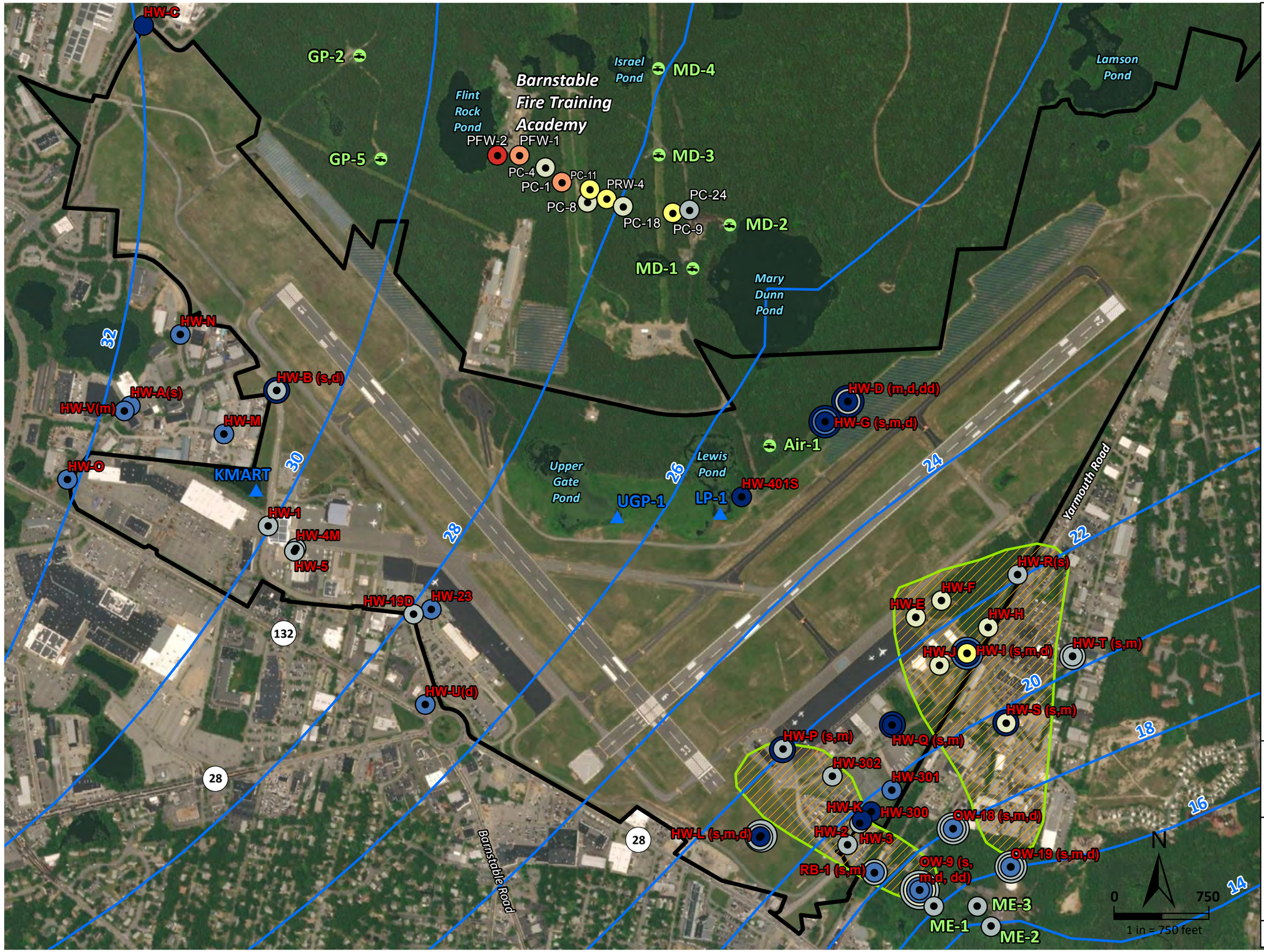
Estimated Disposal Site Boundary for Soil Barnstable Municipal Airport Hyannis, MA

Date: 11/30/2020 Figure 12

** Cape Cod Commission (CCC) Groundwater Contours*

Path: K:\Projects\HYA\17027 BMA PFOS 1-4 IRA\GIS\Maps\201030_SoilPFASTotalZoom.mxd



Legend

- PFAS Monitoring Wells
- Barnstable Fire Training Academy Monitoring Wells
- Sample exceeds PFAS Method 1 GW-1 Standard
- Surface Water Samples Completed by Airport
- Drinking Water Wells
- Barnstable Municipal Airport Property Boundary
- Groundwater Contours
- Estimated Extent of Airport AFFF PFAS Plume

Total PFAS Detected in Groundwater (ug/L)

0 - 0.05	10 - 50
0.05 - 0.1	50 - 100
0.1 - 1	100 - 150
1 - 10	150 - 200

Notes:

1. Multiple circles indicates samples at different depths. The larger the circle, the deeper the sample.

2. Total PFAS is the sum of all laboratory reported PFAS analytes. For locations with multiple sampling events, the most recient event is shown.

3. The Method 1 GW-1 Standard is 0.02 ug/l for the sum of PFHpA,PFHxS,PFOA, PFOS, PFNA and PFDA.

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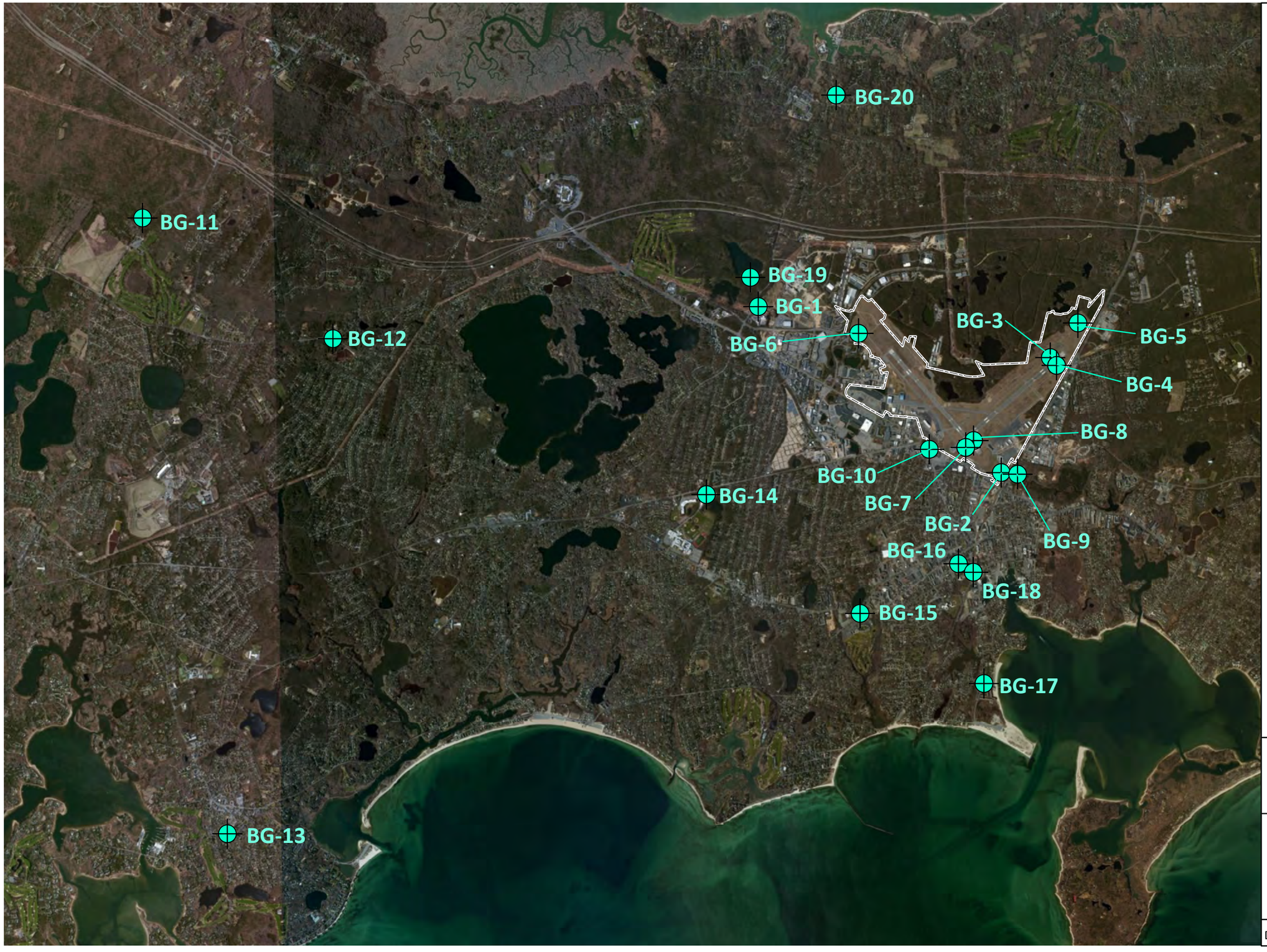
Total PFAS Concentrations in Groundwater Barnstable Municipal Airport Hyannis, MA

Date: 12/9/2020

Figure xx

* Cape Cod Commission (CCC) Groundwater Contours



Legend

- Background PFAS sample locations
- Barnstable Municipal Airport Property Boundary

N

0 1,750

Feet

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Background
PFAS Sample Locations
Barnstable Municipal Airport
Hyannis, MA

Date: 11/25/2020 Figure 14

Path: H:\Projects\HYA\17027 BMA PFOS 1-4 IRA\GIS\Maps\180110_PFOS_BackgroundSampleLocations.mxd

Legend

Barnstable Municipal Airport Property

FEMA Flood Zones

Zone AE - 1% Annual Chance Flood Hazard

0.2% Annual Chance Flood Hazard

Map Panel Number

N

0 800

1" = 800 feet

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FEMA's National Flood Hazard Layer
Barnstable Municipal Airport
Hyannis, MA

Date: 12/10/2019

Figure 14

*Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services

*2016 NAIP imagery service

Document Path: H:\Projects\HYA\19122 HYA Master Plan Update\GIS\Maps\191118_FEMA.mxd

MassDEP - Bureau of Waste Site Cleanup

Phase 1 Site Assessment Map: 500 feet & 0.5 Mile Radii

Site Information:

480 BARNSTABLE ROAD BARNSTABLE, MA

NAD83 UTM Meters:
4613410mN , 393907mE (Zone: 19)
November 25, 2020

The information shown is the best available at the date of printing. However, it may be incomplete. The responsible party and LSP are ultimately responsible for ascertaining the true conditions surrounding the site. Metadata for data layers shown on this map can be found at: https://www.mass.gov/orgs/massgis-bureau-of-geographic-information.

MassDEP
Commonwealth of Massachusetts
Department of Environmental Protection

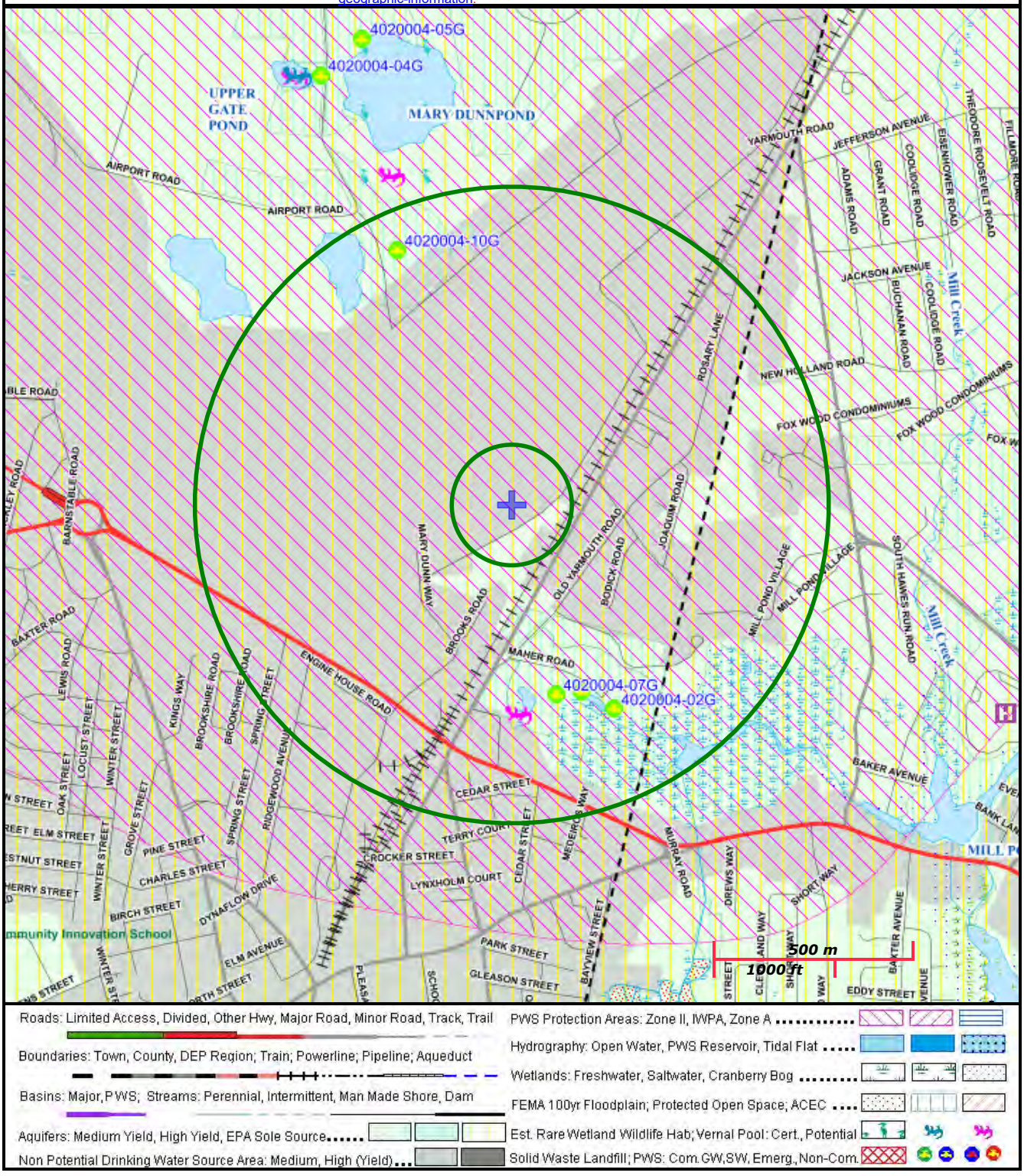


Figure 16 - Priority Resource Map

TABLES

1- Community Notification List
2- Soil Results for PFAS
3- Groundwater Results for PFAS
4- 1,4-Dioxane Results in Groundwater
5- Surface Water Results for PFAS
6- Background PFAS Levels in Soil

Table 1

Community Notification List
Barnstable Municipal Airport

NAME	ADDRESS
Brad Schiff	bschiff@pierce-cote.com
Bronwen Walsh	bwalsh@barnstablepatriot.com
Chanda Beaty	chanda123@yahoo.com
David Dow	ddow420@comcast.net
Geoff Spillane	gspillane@capecodonline.com
Gerard Martin	gerard.martin@mass.gov
Gordon Starr	gordon.m.starr@gmail.com
Keith Lewison	keith.lewison@gmail.com
Lisa Connors	lconnors@pierce-cote.com
Paul Neary	nearyprecinct6@gmail.com
Steve Seymour	steveseymour@comcast.net
Tom Cambareri	tomcambareri@gmail.com
Sue Phelan	suephelan@comcast.net
Amanda Rose	504 Pitchers Way Hyannis, MA 02601
Angela Gallagher	MassDEP Southeast Regional Office Bureau of Waste Site Cleanup 20 Riverside Drive Lakeville, MA 02347
Anthony Alva	184 Mockingbird Lane Marstons Mills, MA 02646
Araceli Alcantara	67 Coolidge Road West Yarmouth, MA 02673
Arthur Beatty	699 Cotuit Road Marstons Mills, MA 02648
Bruce Murphy	Health Department Town of Yarmouth 1146 Route 28 South Yarmouth, MA 02664
Charlie Bloom	29 Oak Street Hyannis, MA 02601
Cheryl Osimo	MBCC PO Box 202 Franklin, MA 02038
Christian Cook	37 Maple Avenue Hyannis, MA 02601
Daniel Knapik	Town Administrator Town of Yarmouth 424 Rte. 28 West Yarmouth, MA 02673
Daniel Santos	Department of Public Works Town of Barnstable 397 Main Street Hyannis, MA 02601
Sylvia Laselva	358 Sea Street Hyannis, MA 02673

NAME	ADDRESS
Darcy Karie	Conservation Commission Town of Barnstable 397 Main Street Hyannis, MA 02601
David Beaty	137 Harbor Bluff Road Hyannis, MA 02601
Eric Kristofferson	Hyannis Fire Department 95 High School Road Ext. Hyannis, MA 02601
Hans Keijser	Department of Public Works Town of Barnstable 397 Main Street
Janine Voiles	67 Coolidge Road West Yarmouth, MA 02673
Jeanny Fichter	1640 Old Stage Rd. West Barnstable, MA 02668
Karl Von Hone	Yarmouth Natural Resources Town of Yarmouth 424 Route 28 West Yarmouth, MA 02673
Luiz Gonzaga	92 High School Rd. Hyannis, MA 02601
M. Curley	39 Oak Ridge Road Osterville, MA 02655
Maia Fitzstevens	Silent Spring Institute 320 Nevada Street, Suite 302 Newton, MA 02460
Vilson Kote	106 Betty's Path West Yarmouth, MA 02673
Mainur Kote	106 Betty's Path West Yarmouth, MA 02673
Margo Pisacano	73 Harbor Bluff Road Hyannis, MA 02601
Mark Ells	Town Manager Town of Barnstable 397 Main Street Hyannis, MA 02601
Mark Forest	Board of Selectmen c/o Town Administrator's Office 1146 Route 28 South Yarmouth, MA 02664
Michael Gorenstein	Department of Public Works Town of Barnstable 397 Main Street
Nancy Wentzel-Johnson	PO Box 342 Hyannis, MA 02601
Peter Burke	Hyannis Fire Department 95 High School Road Ext. Hyannis, MA 02602
Richard A. Zoino	92 High School Road Hyannis, MA 02601
Richard Rougeau	306 Longbeach Road Centerville, MA 02632
Ronald Beaty	245 Parker Rd. West Barnstable, MA 02668
Rong Jian Liu	5 Fishing Brook Road Yarmouth, MA 02664
Scott Beaty	29 Washington Avenue West Yarmouth, MA 02673
Sue Phelan	Green Cape - PO Box 631 West Barnstable, MA 02668
Thomas McKean	Board of Health Town of Barnstable 397 Main Street Hyannis, MA 02601

Table 2. Soil Results for PFAS Compounds ug/kg

Sample Location			ARFF Building																																		
Sample ID	Method 1 Standard		ARFF1 (0-1')	ARFF1 (2')	ARFF1 (4')	ARFF2 (0-1')	ARFF3 (0-1')	ARFF3 (10-12)	ARFF4 (0-1')	ARFFCB (0-1)	A1 (0-1')	A2 (0-1')	A3 (0-1')	A4 (0-1')	A5 (0-1')	A5 (2-4')	A6 (0-1')	A7 (0-1')	A8 (0-1')	A9 (0-1')	A10 (0-1')	A11 (0-1')	A12 (0-1')	A13 (0-1')	A13 (0-1')	A14 (0-1')	A14 (0-1')	A15 (0-1')	A15 (0-1')	A16 (0-1')	A17 (0-1')	A18 (0-1)	A19 (0-1)	A20 (0-1)	A20 (2-4)	A21 (0-1)	A22 (0-1)	HW-P(M) [8-10]	HW-P(M) [18-20]	DL1(0-1')
Sample Date	S-1/GW-1	S-1/GW-3	6/20/2017	9/26/2017	9/26/2017	6/20/2017	9/26/2017	10/9/2018	9/26/2017	9/26/2017	8/14/2018	8/14/2018	8/14/2018	8/14/2018	8/14/2018	9/24/2020	8/14/2018	8/14/2018	8/14/2018	8/14/2018	8/14/2018	8/14/2018	2/27/2019	9/29/2020	2/27/2019	5/13/2020	2/27/2019	5/13/2020	9/17/2020	9/17/2020	9/29/2020	9/24/2020	9/24/2020	9/24/2020	9/24/2020	9/24/2020	9/29/2020	9/18/2020	9/18/2020	6/20/2017
Perfluoroheptanoic acid (PFHpA)	0.5	300	**0.82 J**	**1.8**	**0.66 J**	0.17 U	**0.60 J**	0.32 J	0.24 U	**0.75 J**	**0.60 J**	0.19 U	0.19 U	0.38 J	0.19 U	**1.1**	0.089 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	**<2.0**	0.396 J	**<1.9**	**0.51 J**	**<2.0**	0.21 U	0.067 J	**1.07**	0.076 J	0.101 J	0.09 U	0.09 U	0.045 U	0.096 J	0.044 U	0.043 U	0.30 J
Perfluorohexanesulfonic acid (PFHxS)	0.3	300	0.23 U	0.23 U	0.23 U	0.23 U	**0.64 J**	0.24 U	0.23 U	0.23 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.12 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	**<2.0**	0.058 U	**<1.9**	0.24 U	**<2.0**	0.21 U	0.085 J	0.058 U	0.054 U	0.059 U	0.121 U	0.121 U	0.06 U	0.055 U	0.059 U	0.058 U	0.23 U
Perfluorooctanoic acid (PFOA)	0.72	300	**0.75 J**	**2.6**	**0.75 J**	0.26 U	**0.78 J**	**1.9**	**0.97 J**	**0.90 J**	0.25 U	0.25 U	0.37 J	0.30 J	**1.9**	0.228 J	0.25 U	0.25 U	0.25 U	0.34 J	0.25 U	0.25 U	**<2.0**	0.67 J	**<1.9**	0.68 J	**<2.0**	0.14 U	0.088 J	**0.989**	0.111 J	0.129 J	0.196 J	0.147 J	0.042 U	0.069 J	0.089 J	0.046 J	0.26 U
Perfluorononanoic acid (PFNA)	0.32	300	**2.5**	**5.7**	**1.4**	0.20 J	**0.91 J**	**3.1**	**2.9**	0.17 U	0.22 U	0.22 U	**0.51 J**	0.22 U	**0.87 J**	0.148 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	**<2.0**	**1.2**	**<1.9**	**0.54 J**	**<2.0**	0.15 U	0.119 J	**0.774 J**	0.281 J	0.246 J	0.15 U	0.15 U	0.075 U	0.11 J	0.073 U	0.072 U	0.17 U
Perfluorooctane sulfonate (PFOS)	2	300	**4.5**	**2.7**	1.1	0.29 J	**4.4**	1.1	1.0	1.1	0.26 U	0.26 U	0.29 J	0.26 U	0.26 U	0.257 U	0.26 U	0.38 J	0.26 U	0.85 J	0.26 U	0.26 U	0.26 U	**2.02**	1.3	<1.9	0.32 J	<2.0	0.29 J	**2.02**	0.573 J	1.15	0.611 J	0.259 U	0.26 U	0.276 J	0.559 J	0.0127 U	0.0124 U	0.40 J
Perfluorodecanoic Acid (PFDA)	0.3	300	**4.4**	**1.2**	**0.62 J**	0.13 U	**1.6**	0.28 U	**0.85 J**	0.13 U	0.28 U	0.28 U	**0.42 J**	0.28 U	**1.4**	0.133 U	0.28 U	0.28 U	0.28 U	0.28 U	0.28 U	0.28 U	**0.33 J**	0.28 U	**<1.9**	**0.95 J**	**<2.0**	0.15 U	0.074 J	0.147 J	0.146 J	0.066 U	0.134 U	0.134 U	0.067 U	0.119 J	0.065 U	0.064 U	**0.63 J**
Sum of Laboratory Reported PFAS (Total PFAS) and Sum of Six																																							
Total PFAS	NA	NA	120.06	41.75	46.85	1.16	23.72	11.03	11.9	95.43	0	0	6.2	1.14	161.07	0.613	1.5	1.35	0.48	1.92	1.1	0.43	0	0.0	5.2	0	13.15	0.0	0.45	3.131	11.267	2.652	1.409	0.316	0.147	0.571	1.412	0.411	0.09	11.14
Sum of Six (PFHpA,PFHxS,PFOA, PFOS, PFNA, and PFDA)	NA	NA	12.97	14	4.53	0.49	8.93	6.42	6.47	2.6	0	0	1.97	0.3	5.27	0.228	0	0.38	0	1.19	0.33	0	0	0	3.916	0	3	0	0.29	2.453	3.553	1.764	1.087	0.196	0.147	0.276	0.953	0.089	0.046	1.33

Sample Location			Deployment Area																																		
Sample ID	Method 1 Standard		DL2 (0-1')	DL2 2'	DL2 4'	DL3 (0-1')	DL3 2'	DL3 4'	DL4 (0-1')	DL4 2'	DL4 4'	DL5 (0-1')	DL5 2'	DL5 4'	DL6 (0-1')	DL7 (0-1')	DL8 (2')	DL8 (4')	DL9 (0-1')	DL10 (0-1')	DL 11 (0-1')	DL 11 (0-1')	DL11 (4-6')	DL11 (10-12')	DL11 (14-16')	DL12 (0-1')	DL13 (0-1')	DL14 (0-1')	DL14 (4-6')	DL14 (10-12')	DL14 (14-16')	DL15 (0-1)	DL16 (0-1)	DL17 (0-1)	DL18 (0-1)	DL19 (0-1)	DL20 (0-1)	DL21 (0-1)	DL22 (2-4)	DL22 (6-8)
Sample Date	S-1/GW-1	S-1/GW-3	6/20/2017	9/26/2017	9/26/2017	6/20/2017	9/26/2017	9/26/2017	6/20/2017	9/26/2017	9/26/2017	6/20/2017	9/26/2017	9/26/2017	6/20/2017	6/20/2017	6/20/2017	9/26/2017	6/20/2017	6/20/2017	9/26/2017	8/20/2019	10/4/2018	10/4/2018	10/4/2018	9/26/2017	9/26/2017	9/26/2017	10/4/2018	10/4/2018	10/4/2018	9/30/2020	9/30/2020	9/25/2020	9/25/2020	9/25/2020	9/25/2020	9/25/2020	9/25/2020	9/25/2020
Perfluoroheptanoic acid (PFHpA)	0.5	300	**1.9**	**1.2**	0.48 J	**0.84 J**	0.17 U	0.17 U	0.31 J	0.17 U	0.17 U	**2.5**	0.40 J	0.50 J	**5.0**	**2.5 J**	**2.9 J**	**4.7 J**	**0.66 J**	**1.3**	**2.1**	**1.8**	**1.3**	0.31 J	0.23 J	**1.2**	**1.6**	**4.9**	0.36 J	0.19 U	**1.4**	0.175 U	0.138 J	0.167 U	0.319 J	0.145 U	0.157 U	0.158 U	0.109 J	0.481 J
Perfluorohexanesulfonic acid (PFHxS)	0.3	300	**1.8**	**1.3**	**0.59 J**	**0.34 J**	0.23 U	0.23 U	0.23 U	0.23 U	0.23 U	**0.49 J**	**0.49 J**	0.23 U	0.23 U	**2.3 U**	**2.3 U**	**2.3 U**	**0.35 J**	**0.94 J**	**0.82 J**	**<0.9**	0.24 U	0.24 U	0.24 U	0.23 U	0.23 U	**0.71 J**	0.24 U	0.24 U	**0.74 J**	0.235 U	0.057 U	0.224 U	0.159 J	0.194 U	0.21 U	0.212 U	0.057 U	0.07 J
Perfluorooctanoic acid (PFOA)	0.72	300	1.6	**4.1**	**0.74 J**	**0.80 J**	0.26 U	0.26 U	**0.83 J**	0.26 U	0.26 U	**3.7**	**1.6**	0.26 U	0.26 U	**4.2 J**	**25**	**22**	0.68 J	**1.7**	**4.7**	**5.2**	**2.9**	**1.9**	0.50 J	**4.6**	**2.4**	**23**	0.58 J	0.32 J	**2.9**	0.184 U	0.057 U	0.224 U	0.159 J	**0.979 J**	0.135 U	0.146 U	0.159 J	0.447 J	**1.32**
Perfluorononanoic acid (PFNA)	0.32	300	**0.81 J**	**2.5**	0.17 U	**0.55 J**	0.17 U	0.17 U	**2.7**	0.17 U	**3.7**	0.19 J	0.17 U	0.17 U	0.19 J	**9.6 J**	**46**	**1.7 U**	0.22 J	0.17 U	**16**	**2.4**	**2.5**	0.22 U	0.22 U	**7.3**	**1.5**	**10**	0.22 U	0.22 U	**10**	0.292 U	0.285 J	0.277 U	0.296 J	0.241 U	0.261 U	0.263 U	**5.46**	**2.66**
Perfluorooctane sulfonate (PFOS)	2	300	**12**	1.5	0.21 U	0.51 J	0.21 U	0.21 U	2.0	0.21 U	0.50 J	0.21 U	0.21 U	0.21 U	0.21 U	**3.9 J**	**14**	**2.1 U**	0.38 J	0.26 J	**29**	1.5	0.26 U	0.26 U	0.26 U	**23**	0.66 J	**7.6**	0.26 U	0.26 U	**2.3**	0.505 U	0.575 J	0.481 U	1.05 J	0.418 U	0.452 U	0.456 U	**20.3**	**8.85**
Perfluorodecanoic Acid (PFDA)	0.3	300	0.13 U	0.13 U	0.13 U	**1.4**	0.13 U	0.13 U	**1.3**	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	**1.3 U**	**1.3 U**	**1.3 U**	0.13 U	0.13 U	**1.8**	**8.7**	0.28 U	0.28 U	0.28 U	**0.66 J**	**7.4**	**9.6**	0.28 U	0.28 U	0.28 U	0.26 U	0.181 J	0.248 U	0.167 J	0.215 U	0.233 U	0.235 U	**0.834 J**	**0.383 J**
Sum of Laboratory Reported PFAS (Total PFAS) and Sum of Six																																							
Total PFAS	NA	NA	24.41	12.17	2.38	84.86	9.56	13.81	9.6	0.88	5.9	11.03	2.49	0.5	18.59	404.4	1727.2	949.6	6.38	9.1	85.22	91.5	11.07	6.82	7.63	108.56	521.26	598.24	50.11	21.22	116.64	4.523	2.269	0.628	4.84	0	0	0.68	66.813	41.988
Sum of Six (PFHpA,PFHxS,PFOA, PFOS, PFNA, and PFDA)	NA	NA	18.11	10.6	1.81	4.44	0	0	7.14	0	4.2	6.88	2.49	0.5	5.19	20.2	87.9	26.7	2.29	4.2	54.42	19.6	6.7	2.21	0.73	36.76	13.56	55.81	0.94	0.32	17.34	0.334	1.402	0.166	2.97	0	0	0.159	27.15	13.764

Sample Location			Deployment Area																		
Sample ID	Method 1 Standard		DL22 (18-20)	DL23 (0-1)	D1 (0-1')	D2 (0-1')	D3 (0-1')	D4 (0-1')	D5 (0-1')	D6 (0-1')	D7 (0-1')	D8 (0-1')	D9 (0-1')	D10 (0-1')	D11 (0-1')	D12 (0-1')	HW-F (10-12')	HW-F (14-16')	HW-3 (0-1')	MCI Drill (0-1)	Annual Deployment (0-1)
Sample Date	S-1/GW-1	S-1/GW-3	9/25/2020	9/29/2020	8/14/2018	8/14/2018	8/14/2018	8/14/2018	8/14/2018	8/14/2018	8/14/2018	8/14/2018	8/14/2018	8/14/2018	8/14/2018	8/14/2018	10/4/2018	10/4/2018	10/9/2018	12/9/2016	12/9/2016
Perfluoroheptanoic acid (PFHpA)	0.5	300	0.073 J	0.24 J	0.19 U	0.21 J	0.19 U	**0.95 J**	0.22 J	0.25 J	**7.8**	**1.0**	**2.7**	0.19 U	0.19 U	0.19 U	0.32 J	**1.3**	0.19 U	**8.4**	**20**
Perfluorohexanesulfonic acid (PFHxS)	0.3	300	0.059 U	0.134 J	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	**0.31 J**	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	**0.5 J**	**4 U**
Perfluorooctanoic acid (PFOA)	0.72	300	0.176 J	0.471 J	0.25 U	0.33 J	0.25 U	**1.1**	0.25 U	0.28 J	**14**	**2.2**	**3**	0.25 U	0.25 U	0.25 U	0.25 U	**1.4**	0.25 U	**23**	**100**
Perfluorononanoic acid (PFNA)	0.32	300	**0.476 J**	0.176 J	0.22 U	**0.67 J**	0.22 U	**0.98 J**	0.22 U	0.22 U	**10**	**0.59 J**	**0.83 J**	0.22 U	0.22 U	0.32 J	0.22 U	0.22 U	0.22 U	**14**	**31**
Perfluorooctane sulfonate (PFOS)	2	300	1.18	0.725 J	0.26 U	0.66 J	0.38 J	**2.9**	0.26 U	0.26 U	**3.4**	**2.1**	0.67 J	0.54 J	0.91 J	0.44 J	0.26 U	0.26 U	0.26 U	**24**	1.9 J
Perfluorodecanoic Acid (PFDA)	0.3	300	0.065 U	0.266 J	0.28 U	0.28 U	0.28 U	**0.40 J**	0.28 U	**0.66 J**	**8.6**	**1.3**	**1.6**	0.28 U	0.28 U	0.28 U	0.28 U	0.28 U	0.28 U	**20**	**69**
Sum of Laboratory Reported PFAS (Total PFAS) and Sum of Six																					
Total PFAS	NA	NA	11.352	4.053	0.74	1.87	0.94	11.42	3.01	9.06	151.24	24.61	43.41	0.83	1.62	1.47	25.27	146.5	0	1,524	5,972.9
Sum of Six (PFHpA,PFHxS,PFOA, PFOS, PFNA, and PFDA)	NA	NA	1.905	2.012	0	1.87	0.38	6.33	0.22	1.19	43.8	7.5	8.8	0.54	0.91	0.76	0.32	2.7	0	89.9	221.9

Sample Location			1991 Drill Location					
Sample ID	Method 1 Standard		1991A (0-1')	1991B (0-1')	1991C (0-1')	1991D (0-1')	1991A-B (3-4')	1991C-D (2-3')
Sample Date	S-1/GW-1	S-1/GW-3	8/14/2018	8/14/2018	8/14/2018	8/14/2018	12/14/2018	12/14/2018
Perfluoroheptanoic acid (PFHpA)	0.5	300	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U
Perfluorohexanesulfonic acid (PFHxS)	0.3	300	0.24 U	**0.66 J**	0.24 U	0.24 U	0.24 U	0.24 U
Perfluorooctanoic acid (PFOA)	0.72	300	0.25 U	0.26 J	0.25 U	0.25 U	0.25 U	0.25 U
Perfluorononanoic acid (PFNA)	0.32	300	0.22 U	0.22 U	0.22 U	0.30 J	0.22 U	0.22 U
Perfluorooctane sulfonate (PFOS)	2	300	0.49 J	1.1	0.55 J	0.36 J	0.30 J	0.42 J
Perfluorodecanoic Acid (PFDA)	0.3	300	0.28 U	0.28 U	0.28 U	0.28 U	0.28 U	0.28 U
Sum of Laboratory Reported PFAS (Total PFAS) and Sum of Six								
Total PFAS	NA	NA	0.49	3.18	0.55	0.66	0.3	0.42
Sum of Six (PFHpA,PFHxS,PFOA, PFOS, PFNA, and PFDA)	NA	NA	0.49	2.02	0.55	0.66	0.3	0.42

Notes:
< = Not detected by the laboratory above the reporting limit. Reporting limit shown.
J = Estimated concentration between the method detection limit and reporting limit.
Results in ug/kg, micrograms per kilogram.
U= Not detected by the Laboratory above the method detection limit. Method detection limit shown.
Bold results above the proposed Method 1 S-1/GW-1 standard.
Total PFAS is the sum of all laboratory detected PFAS analytes including estimated values and does not include non-detects (U or <).
Sum of six includes estimated values and does not include non-detects (U or <).

Table 3. Groundwater Results for PFAS Compounds ug/L

Sample Location	North Ramp											Lewis Pond Area	Airport Road/Iyannough Road Area										ARFF Building Area						Solar Field						
Sample ID	HW-1	HW-1	HW-1	HW-4M	HW-5	HW-5	HW-5	HW-23	HW-23	HW-19D	HW-19D	HW-401S	HW-A(S)	HW-B(S)	HW-B(S)	HW-B(D)	HW-C	HW-M	HW-N	HW-O	HW-U(d)	HW-V(m)	HW-L (s)	HW-L (m)	HW-L (d)	HW-L (d)	HW-P (s)	HW-P (m)	HW-Q (s)	HW-Q (s)	HW-Q (m)	HW-D (m)	HW-D (m)	HW-D (d)	HW-D (d)	HW-D (dd)	HW-D (dd)	HW-G(S)	HW-G(M)	HW-G(D)
Sample Date	7/1/2016	6/20/2017	11/1/2018	4/5/2017	7/1/2016	4/7/2017	11/1/2018	6/20/2017	11/1/2018	6/20/2017	11/7/2018	4/7/2017	4/7/2017	4/7/2017	10/26/2018	10/26/2018	4/7/2017	6/24/2019	6/24/2019	7/2/2019	10/2/2020	10/2/2020	10/7/2020	10/7/2020	6/19/2019	10/7/2020	10/1/2020	10/1/2020	10/1/2020	11/6/2020	10/1/2020	4/7/2017	5/13/2020	6/24/2019	5/13/2020	6/24/2019	5/13/2020	12/3/2018	12/3/2018	12/3/2018
TOC Elevation	51.51	51.51	51.51	54.02	54.98	54.98	54.98	50.65	50.65	49.10	49.10	41.58	55.34	51.84	51.84	51.95	69.25	53.69	49.49	43.46	48.80	53.83	39.07	38.98	39.15	39.15	40.51	40.64	37.89	37.89	37.90	45.20	45.20	45.08	45.08	45.05	45.05	44.99	45.11	44.93
Depth to Groundwater	21.63	25.00	21.83	26.20	24.94	26.75	25.27	22.70	24.01	21.29	22.19	17.95	24.62	22.26	21.59	21.66	38.50	20.32	15.48	3.62	24.66	22.90	21.96	21.88	19.40	22.22	22.69	22.80	21.45	22.04	21.41	18.83	18.34	18.99	18.23	20.60	19.97	20.69	20.75	20.71
Groundwater Elevation	29.88	26.51	29.68	27.82	30.04	28.23	29.71	27.95	26.64	27.81	26.91	23.63	30.72	29.58	30.25	30.29	30.75	33.37	34.01	39.84	24.14	30.93	17.11	17.10	19.75	16.93	17.82	17.84	16.44	15.85	16.49	26.37	26.86	26.09	26.85	24.45	25.08	24.30	24.36	24.22
Total Well Depth	30.84	30.84	30.84	32.32	27.80	27.80	27.80	28.11	28.11	41.30	41.30	23.60	32.00	30.23	30.23	57.20	42.15	26.92	22.33	14.10	62.30	36.15	27.33	37.33	70.55	70.55	27.60	38.30	26.60	26.60	36.79	30.32	30.32	44.94	44.94	65.05	65.05	28.45	38.25	48.28
Perfluoroheptanoic acid (PFHpA)	0.01	0.0042 J	0.013 J	0.007 J	0.0041	0.0084 J	0.0074 U	0.0045J	0.0098 J	0.0052 J	0.0080 J	0.0043 J	0.0048 J	0.049	0.012 J	0.0074 U	0.0033 U	0.007	0.0034	<0.002	0.01	0.0033	0.00053 U	0.0064	0.0078	0.0065	0.026	0.003	0.0018 J	0.0021	<0.002	0.0033 U	<0.002	0.021	0.017	<0.002	<0.002	0.0074 U	0.0074 U	0.0074 U
Perfluorohexanesulfonic acid (PFHxS)	0.018	0.065	0.018 J	0.02	0.011	0.018 J	0.0056 U	0.021	0.023	0.046	0.045	0.011 J	0.0079 J	0.044	0.047	0.0056 U	0.0034 U	0.016	0.033	0.0043	0.018	0.0032	0.0013	0.023	0.033	0.015	0.0018 J	0.00085	0.013	0.0087	0.0019 J	0.0089 J	<0.002	0.062	0.039	0.0092	0.008	0.0056 U	0.012 J	0.0056 U
Perfluorononanoic acid (PFNA)	<0.002	0.0057 J	0.0087 U	0.0046 U	<0.002	0.0046 U	0.0088 J	0.0038 U	0.0087 U	0.0065 J	0.0087 U	0.0046 U	0.0046 U	0.0046 U	0.0087 U	0.0087 U	0.0046 U	<0.002	<0.002	<0.002	0.0016 J	0.0017 J	0.00063 U	0.0025	0.0033	0.0022	0.0061	0.0011 J	<0.002	<0.002	0.00075 J	0.0046 U	<0.002	0.015	0.019	0.0041	0.0029	0.0087 U	0.011 J	0.0087 U
Perfluorooctanoic acid (PFOA)	0.017	0.022	0.031	0.011 J	0.12	0.020 J	0.011 J	0.0046 U	0.011 J	0.017 J	0.014 J	0.0046 U	0.0026 U	0.0094 J	0.020 J	0.012 J	0.0026 U	0.027	0.0088	0.0039	0.01	0.0063	0.00071 U	0.01	0.025	0.018	0.0084	0.0018 J	0.0049	0.0062	0.00095 J	0.0046 U	<0.002	0.0088	0.0076	<0.002	<0.002	0.0033 U	0.0033 U	0.0033 U
Perfluorooctane sulfonate (PFOS)	0.033	0.24	0.028	0.043	0.031	0.052	0.12	0.0079 J	0.015 J	0.061	0.069	0.012 J	0.0046 U	0.026	0.019 J	0.010 J	0.0046 U	0.0074	0.004	0.017	0.023	0.0059	0.0014	0.07	0.049	0.039	0.00097	0.0011 J	0.0041	0.0075	0.0049	0.022	0.0011	0.095	0.12	0.013	0.013	0.0060 U	0.036	0.0060 U
Perfluorodecanoic Acid (PFDA)	NA	0.0040 U	0.0061 U	0.0040 U	NA	0.0040 U	0.0061 U	0.0040 U	0.0061 U	0.0040 U	0.0061 U	0.0040 U	0.0040 U	0.0040 U	0.0061 U	0.0061 U	0.0040 U	<0.002	<0.002	0.0021	<0.002	<0.002	0.00062 U	0.00062 U	<0.002	0.0019	0.00085	<0.002	<0.002	<0.002	<0.002	0.0040 U	<0.002	<0.002	<0.002	<0.002	<0.002	0.0061 U	0.0061 U	0.0061 U
Sum of Laboratory Reported PFAS (Total PFAS) and Sum of Six																																								
Total PFAS	0.078	0.4247	0.15	0.1162	0.1661	3.0021	0.1507	0.0745	0.0858	0.1758	0.16	0.0313	0.0779	0.4561	0.186	0.0465	0.0034	0.0927	0.0727	0.0585	0.0889	0.0543	0.0027	0.18375	0.1823	0.12348	0.2478	0.02967	0.0307	0.0346	0.00944	0.0309	0.0011	0.2768	0.24993	0.0263	0.02444	0	0.059	0
Sum of Six (PFHpA,PFHxS,PFOA, PFOS, PFNA, and PFDA)	**0.078**	**0.3369**	**0.09**	**0.081**	**0.1661**	**0.0984**	**0.1398**	**0.0334**	**0.0588**	**0.1357**	**0.136**	**0.0273**	0.0127	**0.1284**	**0.098**	**0.022**	<0.0046	**0.0574**	**0.0492**	**0.0273**	**0.0588**	**0.0204**	0.0027	**0.1119**	**0.1181**	**0.0826**	**0.04412**	0.00785	**0.0238**	**0.0245**	0.0085	**0.0309**	0.0011	**0.2018**	**0.2026**	**0.0263**	**0.0239**	0.0087 U	**0.059**	0.0087 U

Sample Location	Deployment Area																						Maher Wells									Yarmouth Road	
Sample ID	HW-1 (s)	HW-1 (s)	HW-1 (m)	HW-1 (m)	HW-1 (d)	HW-1 (d)	HW-J	HW-E	HW-E	HW-E	HW-E	HW-F	HW-F	HW-F	HW-H	HW-H	HW-R	HW-S (s)	HW-S (m)	HW-T (s)	HW-T (m)	OW-9S	OW-9S	OW-9S	OW-9M	OW-9M	OW-9D	OW-9D	OW-9D	OW-9DD	OW-9DD	OW-9DD	ME-1*	ME-2**	ME-3***	RB-1 (s)	RB-1 (m)
Sample Date	11/7/2018	5/8/2020	6/24/2019	5/8/2020	6/24/2019	5/8/2020	11/7/2018	4/5/2017	11/7/2018	8/19/2019	5/5/2020	4/5/2017	11/7/2018	5/5/2020	11/7/2018	5/8/2020	10/1/2020	10/1/2020	10/1/2020	10/1/2020	10/1/2020	7/5/2016	12/3/2018	5/8/2020	12/3/2018	5/8/2020	7/5/2016	12/3/2018	5/5/2020	4/11/2017	12/3/2018	10/2/2020	9/17/2020	9/17/2020	9/17/2020	11/5/2020	11/5/2020
TOC Elevation	36.08	36.08	36.27	36.27	36.02	36.02	37.10	38.45	38.45	38.45	38.45	36.32	36.32	36.32	38.47	38.47	35.72	31.60	31.59	28.97	29.11	23.25	23.25	23.25	23.53	23.53	23.22	23.22	23.22	23.81	23.81	23.81	NA	NA	NA	NA	NA
Depth to Groundwater	18.35	15.39	16.33	15.61	16.20	15.49	19.18	19.05	19.38	17.82	16.16	19.60	20.08	16.82	20.39	17.37	18.33	16.88	17.01	13.41	13.58	12.23	10.80	10.14	11.11	10.45	12.48	10.82	10.15	12.10	11.30	13.04	3.60	6.50	6.00	17.87	17.79
Groundwater Elevation	17.73	20.69	19.94	20.66	19.82	20.53	17.92	19.40	19.07	20.63	22.29	16.72	16.24	19.50	18.08	21.10	17.39	14.72	14.58	15.56	15.53	11.02	12.45	13.11	12.42	13.08	10.74	12.40	13.07	11.71	12.51	10.77	NA	NA	NA	NA	NA
Total Well Depth	25.10	25.10	34.80	34.80	41.67	41.67	24.30	26.22	26.22	26.22	26.22	26.89	26.89	26.89	27.09	27.09	23.56	22.10	32.04	18.54	28.96	21.35	21.35	21.35	56.20	56.20	68.63	68.63	68.63	86.75	86.75	86.75	81.20	54.20	50.30	27.83	49.85
Perfluoroheptanoic acid (PFHpA)	0.2	0.54	0.0032	0.0012	0.0053	0.0046	0.025	0.15	0.0074 U	0.0053	0.044	0.34	0.0074 U	0.23	0.077	0.28	0.021	0.11	0.0009 6 J	0.0039	0.022	0.014	0.048	0.0064	0.11	0.0061	0.0028	0.033	0.044	0.034	0.015 J	0.0085	0.011	0.0055	0.0036	0.0042	0.011
Perfluorohexanesulfonic acid (PFHxS)	0.18	0.22	0.019	0.0091	0.057	0.018	0.0056 U	0.042	0.0056 U	0.0021	0.011	0.019J	0.0056 U	0.005	0.0056 U	0.0031	0.02	0.055	0.0064	0.17	0.019	<0.003	0.023	0.011	0.0056 U	0.0033	0.012	0.12	0.18	0.12	0.042	0.019	0.03	0.04	0.018	0.0084	0.01
Perfluorononanoic acid (PFNA)	0.16	0.082	<0.002	0.00078	<0.002	<0.002	0.028	0.0087 J	0.0087 U	<0.002	0.0052	0.0046 U	0.0087 U	0.00081	0.0087 U	<0.002	0.0031	0.1	<0.002	0.00074 J	0.0032	0.0077	0.0087 U	0.0033	0.044	0.0037	0.0036	0.1	0.15	0.059	0.038	0.018	0.017	0.003	0.004	0.0047	0.0068
Perfluorooctanoic acid (PFOA)	0.26	0.29	0.0061	0.0018	0.0047	0.0028	0.026	0.053	0.0033 U	0.0047	0.027	0.075	0.0033 U	0.02	0.0050 J	0.002	0.014	0.062	0.0013 J	0.0067	0.011	0.0074	0.032	0.0043	0.052	0.0035	0.041	0.057	0.088	0.055	0.020 J	0.01	0.016	0.0077	0.012	0.007	0.013
Perfluorooctane sulfonate (PFOS)	0.066	0.04	0.014	0.014	0.012	0.02	0.13	0.047	0.0060 U	<0.002	0.0037	0.0026 U	0.0060 U	0.00086	0.0060 U	<0.002	0.016	0.1	0.0058	0.21	0.025	0.007	0.024	0.0058	0.0081 J	0.01	0.0052	0.52	0.72	0.5	0.14	0.049	0.11	0.095	0.072	0.038	0.049
Perfluorodecanoic Acid (PFDA)	0.012 U	<0.002	<0.002	<0.002	<0.002	<0.002	0.0061 U	0.0040 U	0.0061 U	<0.002	<0.002	0.0040 U	0.0061 U	<0.002	0.0061 U	<0.002	<0.002	<0.002	<0.002	<0.002	0.0014	NA	0.0061 U	<0.002	0.0061 U	<0.002	NA	0.0061 U	<0.002	0.0040 U	0.0061 U	<0.002	<0.002	<0.002	<0.002	<0.002	0.00075 J
Sum of Laboratory Reported PFAS (Total PFAS) and Sum of Six																																					
Total PFAS	13.346	15.5383	0.0718	0.03308	0.1367	0.08985	1.074	3.2257	0	0.14	1.04526	12.96	0.084	2.65637	4.452	1.26666	0.2171	4.8958	0.02471	0.44114	0.3254	0.0361	0.618	0.06678	1.7141	0.0816	0.0646	1.217	1.5845	1.02	0.39	0.169	0.2873	0.2009	0.14005	0.08008	0.2015
Sum of Six (PFHpA,PFHxS,PFOA, PFOS, PFNA, and PFDA)	**0.866**	**1.172**	**0.0423**	**0.02688**	**0.079**	**0.0454**	**0.209**	**0.3007**	0.0087 U	0.0121	**0.0909**	**0.434**	0.0087 U	**0.25667**	**0.082**	**0.2851**	**0.0741**	**0.427**	0.01446	**0.39134**	**0.0816**	**0.0361**	**0.127**	**0.0308**	**0.2141**	**0.0266**	**0.0646**	**0.83**	**1.182**	**0.768**	**0.255**	**0.1045**	**0.184**	**0.1512**	**0.1096**	**0.0623**	**0.09055**

Sample Location	Maher Wells												Steamship Parking Lot										
Sample ID	OW-18S	OW-18S	OW-18S	OW-18M	OW-18M	OW-18M	OW-18D	OW-18D Duplicate	OW-18D	OW-18D	OW-18D	OW-19(S)	OW-19(M)	OW-19D	OW-19D	HW-2	HW-2	HW-3	HW-3	HW-3	HW-3	HW-300	HW-301	HW-302	HW-302	HW-K	HW-K
Sample Date	7/5/2016	12/7/2018	5/8/2020	7/5/2016	12/7/2018	5/8/2020	7/5/2016	7/5/2016	4/11/2017	12/7/2018	5/13/2020	11/6/2020	11/6/2020	4/11/2017	5/13/2020	7/1/2016	5/5/2020	7/1/2016	4/5/2017	10/26/2018	5/5/2020	7/1/2016	7/1/2016	7/1/2016	12/3/2018	6/19/2019	5/21/2020
TOC Elevation	39.03	39.03	39.03	39.30	39.30	39.30	38.84	38.84	38.84	38.84	38.84	NA	NA	39.06	39.06	40.41	40.41	38.74	38.74	38.74	38.74	36.09	39.46	41.17	41.17	37.70	37.70
Depth to Groundwater	24.40	24.29	23.45	25.82	24.72	23.93	25.95	25.95	25.55	24.28	23.47	27.38	27.57	26.73	25.64	27.48	25.33	25.81	25.70	26.06	23.64	22.52	25.05	23.52	22.65	20.88	20.56
Groundwater Elevation	14.63	14.74	15.58	13.48	14.58	15.37	12.89	12.89	13.29	14.56	15.37	NA	NA	12.33	13.42	12.93	15.08	12.93	13.04	12.68	15.10	13.57	14.41	17.65	18.52	16.82	17.14
Total Well Depth	31.23	31.23	31.23	74.44	74.44	74.44	123.36	123.36	123.36	123.36	123.36	34.56	76.28	110.42	110.42	32.01	32.01	30.08	30.08	30.08	30.08	30.33	30.42	30.45	30.45	44.18	44.18
Perfluoroheptanoic acid (PFHpA)	0.0071	0.0074 U	0.0039	0.0029	0.0074 U	0.0074	0.0071	0.0063	0.015J	0.014 J	0.012	0.0042	0.03	0.0051 J	0.011	0.0071	0.035	0.016	0.1	0.10	0.1	0.0096	0.002	0.019	0.015 J	0.0051	0.0028
Perfluorohexanesulfonic acid (PFHxS)	0.0068	0.0056 U	0.0085	0.016	0.073	0.07	0.01	0.011	0.13	0.13	0.03	0.0031	0.027	0.029	0.12	0.0035	0.0066	0.0043	0.020 J	0.012 J	0.0087	0.012	0.038	0.0063	0.016 J	<0.002	0.001
Perfluorononanoic acid (PFNA)	<0.002	0.0087 U	0.0032	0.0076	0.0087 U	0.0027	0.0065	0.0058	0.0046 U	0.0087 U	0.0028	0.0024	0.002	0.006 J	0.0017	<0.002	0.016	0.0063	0.027	0.023	0.021	<0.002	<0.002	0.054	0.0097 J	<0.002	0.0012
Perfluorooctanoic acid (PFOA)	0.0083	0.012 J	0.01	0.044	0.0060 J	0.0096	0.018	0.019	0.025	0.019 J	0.0095	0.011	0.011	0.0046 U	0.023	0.012	0.039	0.084	0.065	0.057	0.054	0.017	0.011	0.014	0.03	0.0041	0.0019
Perfluorooctane sulfonate (PFOS)	0.018	0.028	0.016	0.0058	0.24	0.18	0.0059	0.0059	0.22	0.32	0.041	0.025	0.047	0.029	0.31	0.0063	0.053	0.0091	0.15	0.053	0.1	0.0052	0.0037	0.033	0.031	<0.002	0.0016
Perfluorodecanoic Acid (PFDA)	NA	0.0061 U	<0.002	NA	0.0061 U	<0.002	NA	NA	0.0040 U	0.0061 U	<0.002	0.0027	<0.002	0.0040 U	<0.002	NA	<0.002	NA	0.0040 U	0.0061 U	0.0014	NA	NA	NA	0.0061 U	<0.002	<0.002
Sum of Laboratory Reported PFAS (Total PFAS) and Sum of Six																											
Total PFAS	0.0402	0.0573	0.05953	0.0763	0.3891	0.4357	0.0475	NA	0.506	0.5504	0.1832	0.0707	0.37335	0.0936	0.5463	0.0289	0.42678	0.1197	1.603	0.952	0.96981	0.0438	0.0547	0.1263	0.3427	0.0348	0.0275
Sum of Six (PFHpA,PFHxS,PFOA, PFOS, PFNA, and PFDA)	**0.0402**	**0.04**	**0.0416**	**0.0763**	**0.319**	**0.2697**	**0.0475**	**0.048**	**0.39**	**0.483**	**0.0953**	**0.0484**	**0.117**	**0.0691**	**0.4657**	**0.0289**	**0.1496**	**0.1197**	**0.362**	**0.245**	**0.2851**	**0.0438**	**0.0547**	**0.1263**	**0.1017**	0.0092	0.0085

Notes:
< = Not detected by the laboratory above the reporting limit. Reporting limit shown.
J = Estimated concentration between the method detection limit and reporting limit
Results in ug/L, micrograms per liter.
U= Not detected by the Laboratory above the method detection limit. Method detection limit shown.
Bold results above Method 1 GW-1 standard (0.02 ug/L).
Sum of six includes estimated values and does not include non-detects (U or <).
Total PFAS is the sum of all laboratory detected PFAS analytes including estimated values and does not include non-detects (U or <).
NA = Not Applicable.
* = ME-1 is screened from 37 to 47 and 70 to 80 feet below grade.
** = ME-2 is screened from 44 to 54 feet below grade.
*** = ME-3 is screened from 40 to 50 feet below grade.
The Method 1 GW-3 Standard for the individual analytes in the Sum of Six ranges from 500 to 40,000 ug/l

Table 4 - 1,4 Dioxane Groundwater Results ug/L

Sample Location	North Ramp															Airport Road/Iyannough Road Area							ARFF Building			
Sample ID	HW-1	HW-1	HW-5	HW-12	OW-6	OW-6	HW-4M	HW-4D	HW-204	HW-29	HW-207S	HW-207D	HW-207D	HW-19D	HW-19D	HW-A(D)	HW-A(D)	HW-B(D)	HW-N	HW-O	HW-U(d)	HW-V(m)	HW-L(s)	HW-L(m)	HW-L(d)	HW-L(d)
Sample Date	5/7/2015	8/5/2019	5/7/2015	5/7/2015	5/7/2015	9/27/2019	4/5/2017	4/5/2017	9/27/2019	9/27/2019	9/27/2019	4/5/2017	9/27/2019	4/5/2017	9/27/2019	4/5/2017	8/5/2019	4/5/2017	8/5/2019	8/5/2019	10/2/2020	10/2/2020	10/7/2020	10/7/2020	7/2/2019	5/13/2020
1,4-Dioxane	<0.152	<0.25	<0.150	<0.150	<0.150	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	**0.73**	**0.8**	<0.2	<0.2	**0.727**	**0.75**
Sample Location	**Maher Well Field**																									
Sample ID	OW-9M	OW-9D	OW-9D	OW-9D	OW-9DD	OW-9DD	OW-9DD	OW-18M	OW-18D	OW-18D	OW-18D	OW-19M	OW-19D	OW-19D	OW-19D											
Sample Date	5/28/2015	5/28/2015	12/3/2018	5/5/2020	5/28/2015	4/11/2017	12/3/2018	4/11/2017	4/11/2017	12/7/2018	5/13/2020	4/11/2017	4/11/2017	12/7/2018	5/13/2020											
1,4-Dioxane	<0.141	<0.141	<0.25	<0.19	**0.926**	**0.838**	**0.732**	<0.25	**0.552**	<0.25	**0.35**	<0.25	**0.800**	<0.25	**0.3**											

Notes:
Results in ug/L, micrograms per liter.
< = Not detected by the laboratory above the reporting limit. Reporting limit shown.
Bold results above Method 1 GW-1 standard (0.3 ug/L).
The Method 1 GW-2 standard for 1,4-dioxane is 6,000 ug/l.
The Method 1 GW-3 standard for 1,4-dioxane is 50,000 ug/l.

Table 5. Surface Water Results for PFAS Compounds ug/L

	Surface Water		
Sample ID	Kmart	LP-1	UGP-1
Sample Date	6/20/2017	7/11/19	7/11/19
Perfluoroheptanoic acid (PFHpA)	0.0033 U	<0.01	<0.02
Perfluorohexanesulfonic acid (PFHxS)	0.0034 U	<0.01	<0.02
Perfluorononanoic acid (PFNA)	0.0043 J	<0.01	<0.02
Perfluorooctanoic acid (PFOA)	0.0026 U	<0.01	<0.02
Perfluorooctane sulfonate (PFOS)	0.0046 U	<0.01	<0.02
Perfluorodecanoic Acid (PFDA)	0.0040 U	<0.01	<0.02
Sum of Laboratory Reported PFAS (Total PFAS) and Sum of Six			
Total PFAS	0.0174	0.018	0.047
Sum of Six (PFHpA,PFHxS,PFOA, PFOS, PFNA, and PFDA)	0.0043	<0.01	<0.02

Notes:

< = Not detected by the laboratory above the reporting limit. Reporting limit shown.

J = Estimated concentration between the method detection limit and reporting limit.

Results in ug/L, micrograms per liter.

U= Not detected by the laboratory above the method detection limit. Method detection limit shown.

Sum of six includes estimated values and does not include non-detects (U or <).

Total PFAS is the sum of all laboratory detected PFAS analytes including estimated values and does not include non-detects (U or <).

Currently MassDEP has not issued a surface water standard for PFAS.

The Method 1 GW-1 Standard for the Sum of Six is 0.02 ug/l.

The Method 1 GW-1 Standard for the individual analytes in the Sum of Six range from 500 to 40,000 ug/l.

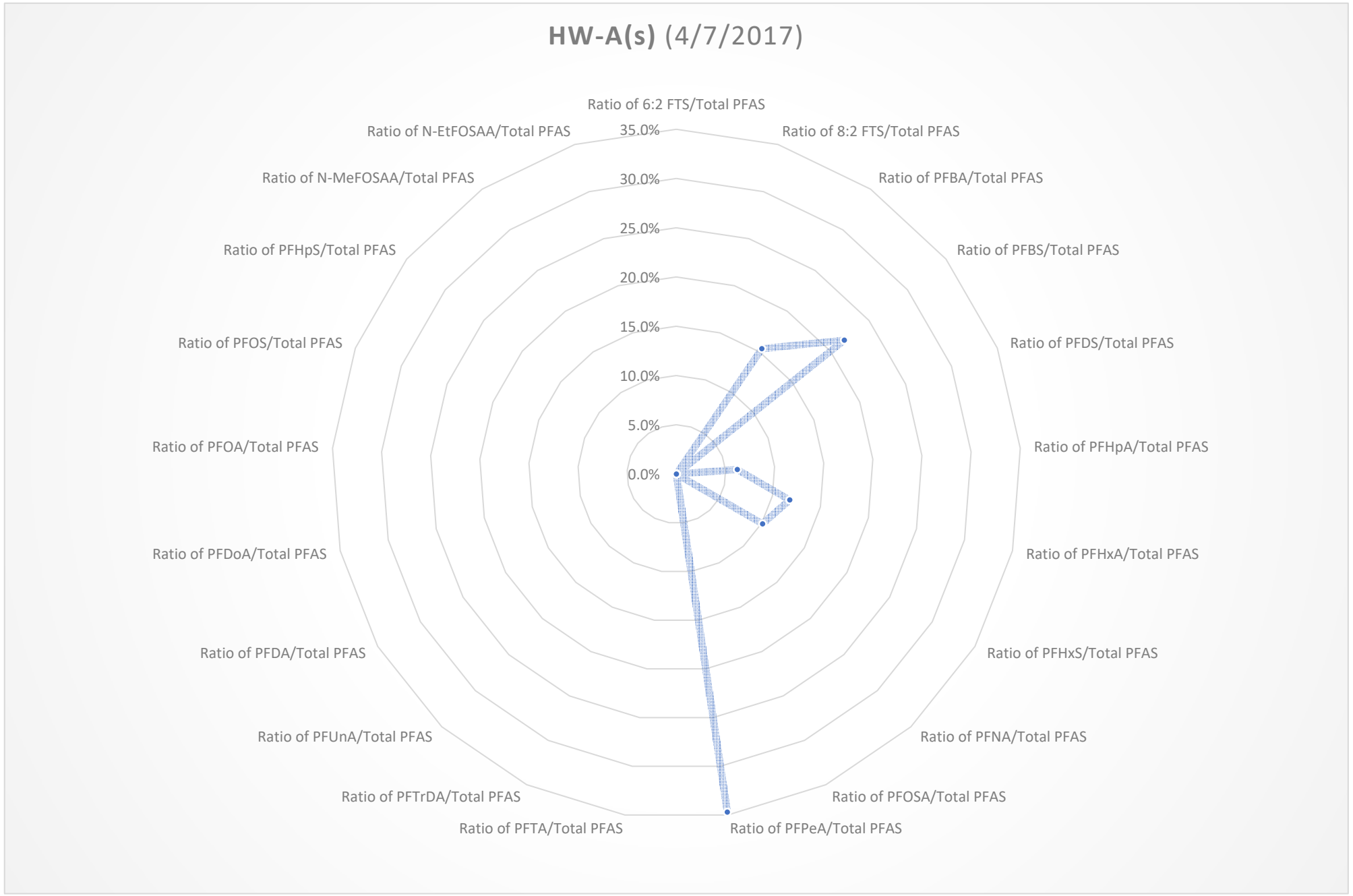
Table 6: Background Levels of PFAS

Background Sample Locations																					
Sample ID	Method 1 Standard		BG-1 0-1'	BG-2 0-1'	BG-3 0-1'	BG-4 0-1'	BG-5 0-1'	BG-6 0-1'	BG-7 0-1'	BG-8 0-1'	BG-9 0-1'	BG-10 0-1'	BG-11 0-1'	BG-12 0-1'	BG-13 0-1'	BG-14 0-1'	BG-15 0-1'	BG-16 0-1'	BG-17 0-1'	BG-18 0-1'	BG-19 0-1'	BG-20 0-1'
Sample Date	S-1/GW-1	S-1/GW-3	10/26/2017	10/26/2017	10/26/2017	10/26/2017	10/26/2017	10/26/2017	10/26/2017	10/26/2017	10/26/2017	10/26/2017	12/14/2017	12/14/2017	12/14/2017	12/14/2017	12/14/2017	12/14/2017	12/14/2017	12/14/2017	12/14/2017	12/14/2017
Sample Location			Off-Airport	On-Airport	On-Airport	On-Airport	On-Airport	On-Airport	On-Airport	On-Airport	Off-Airport	Off-Airport	Off-Airport	Off-Airport	Off-Airport	Off-Airport	Off-Airport	Off-Airport	Off-Airport	Off-Airport	Off-Airport	Off-Airport
Perfluoroheptanoic acid (PFHpA)	0.5	300	0.17 U	0.17 U	0.18 J	0.17 U	0.18 J	0.17 U	0.17 U	0.23 J	0.17 U	0.17 U	0.19 U	0.19 U	0.19 U	0.19 U	0.44 J	0.19 U	0.19 U	0.35 J	0.19 U	0.46 J
Perfluorohexanesulfonic acid (PFHxS)	0.3	300	0.23 U	0.23 U	0.23 U	0.23 U	0.23 U	0.23 U	0.23 U	0.23 U	0.23 U	0.23 U	0.24 U	**0.39 J**	0.24 U	0.24 U	**0.57 J**	**0.47 J**	0.24 U	**0.49 J**	0.24 U	0.24 U
Perfluorooctanoic acid (PFOA)	0.72	300	0.58 J	0.26 U	0.26 U	0.16 U	0.47 J	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	**0.75 J**	0.67 J	0.33 J	0.25 U	0.46 J	0.37 J	0.36 J	0.5 J	0.25 U	**0.86 J**
Perfluorononanoic acid (PFNA)	0.32	300	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.22 U	0.29 J	0.22 U	0.22 U	**0.53 J**	0.22	**0.67 J**	**0.41 J**	0.22 U	0.22 U
Perfluorooctane sulfonate (PFOS)	2	300	0.21 U	0.7 J	0.38 J	**2.3**	0.41 J	0.32 J	0.33 J	0.31 J	1.3	0.62 J	0.41 J	0.76 J	0.99	0.26 U	**3.1**	2	0.36 J	**2.3**	0.41 J	0.44 J
Perfluorodecanoic Acid (PFDA)	0.3	300	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.28 U	0.28 U	**0.36 J**	0.28 U	**0.31 J**	**0.41 J**	0.28 U	**0.41 J**	0.28 U	0.28 U
Sum of Laboratory Reported PFAS (Total PFAS) and Sum of Six																						
Total PFAS	NA	NA	1.47	0.7	0.56	3.21	1.31	0.32	0.3	0.84	1.3	0.62	1.16	2.73	1.68	0	6.79	3.77	5.09	5.45	0.41	2.43
Sum of Six (PFHpA,PFHxS,PFOA, PFOS, PFNA, and PFDA)	NA	NA	0.58	0.7	0.56	2.3	1.06	0.32	0.33	0.54	1.3	0.62	1.16	2.11	1.68	0	5.41	3.47	1.39	4.46	0.41	1.76

Notes:
J = Estimated concentration between the method detection limit and reporting limit.
Results in ug/kg, micrograms per kilogram.
U= Not detected by the Laboratory above the method detection limit. Method detection limit shown.
Bold results above the applicable Method 1 S-1/GW-1 standard
Total PFAS is the sum of all laboratory detected PFAS analytes including estimated values and does not include non-detects (U or <).
Sum of six includes estimated values and does not include non-detects (U or <).

APPENDIX A

PFAS IN GROUNDWATER RADAR PLOTS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Ratio of 8:2 FTS/Total PFAS
Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
Ratio of PFDS/Total PFAS
Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
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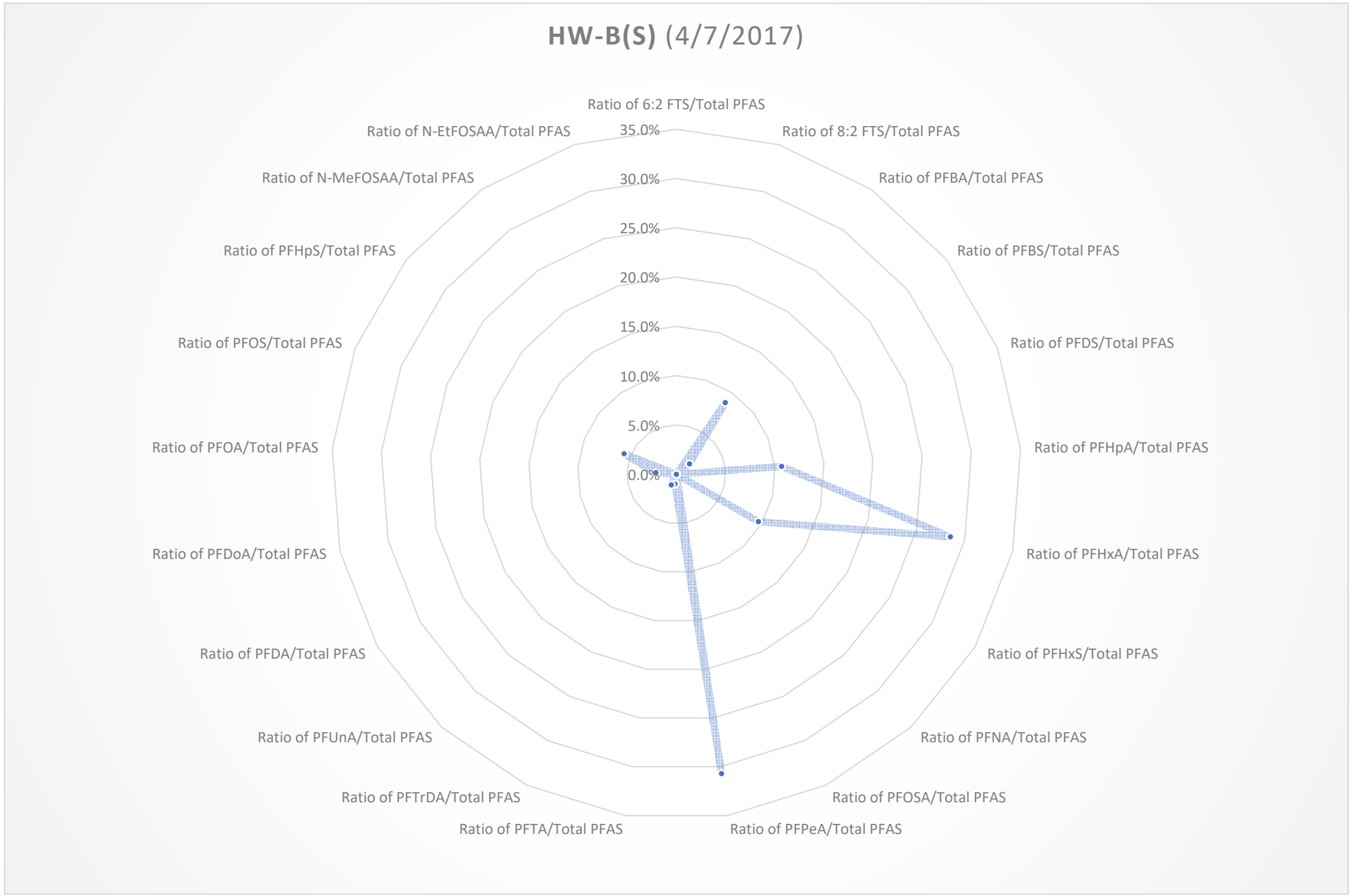
25.0%
20.0%
15.0%
10.0%
5.0%
0.0%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Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
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20.0%
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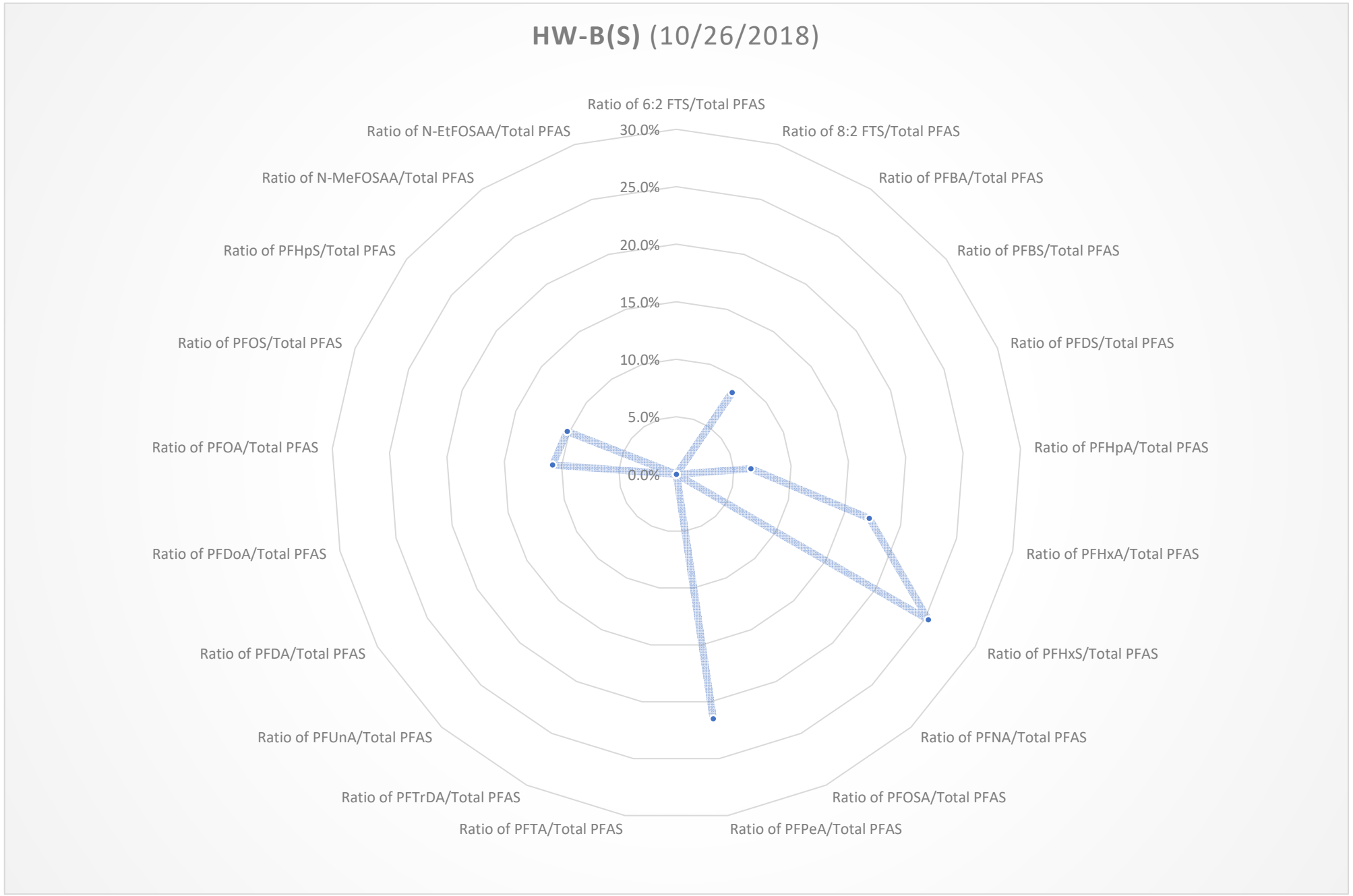
HW-B(S) (10/26/2018)
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Ratio of PFDS/Total PFAS
Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
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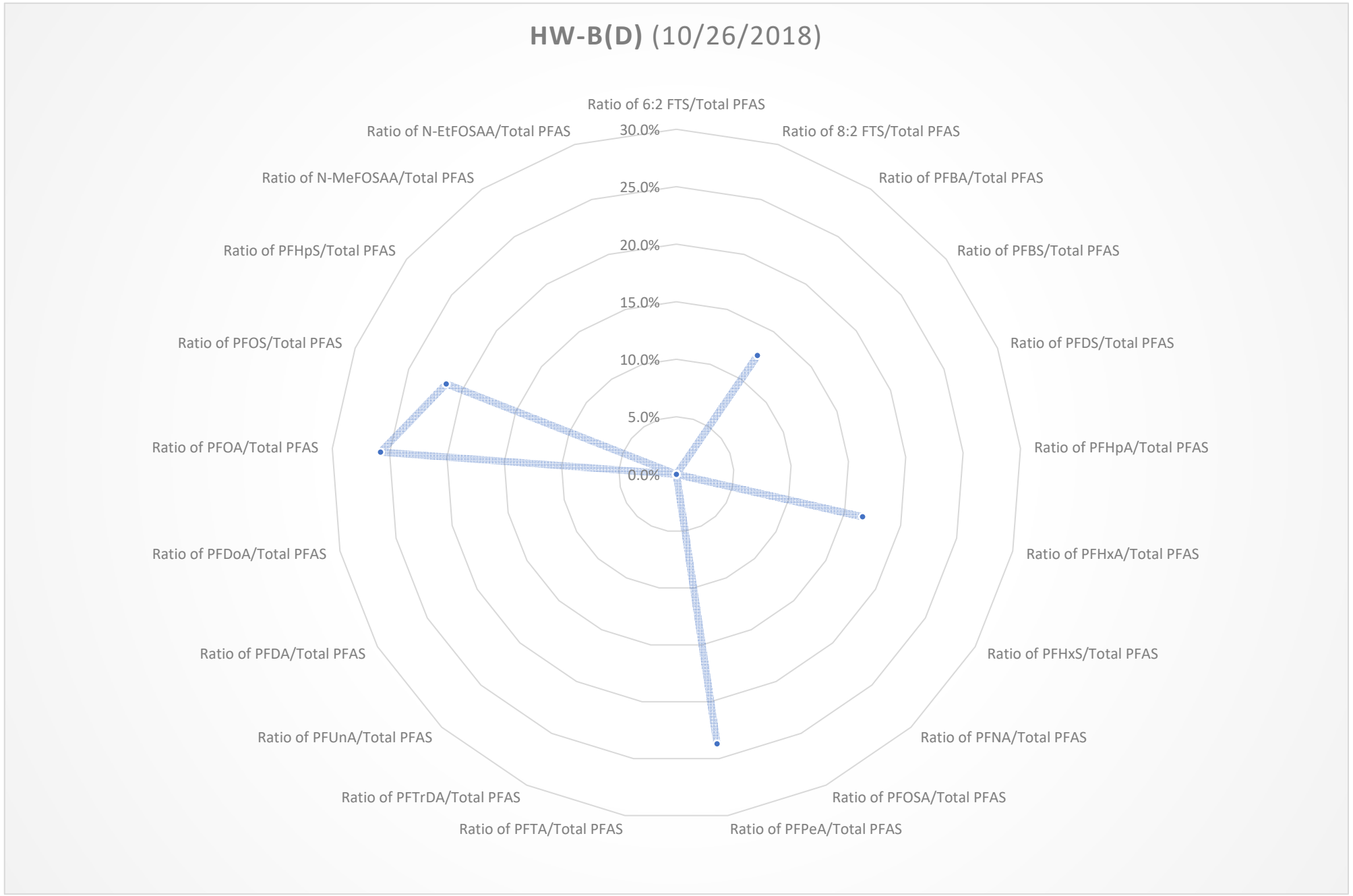
HW-B(D) (10/26/2018)
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Ratio of PFHxA/Total PFAS
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Ratio of PFDoA/Total PFAS
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Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
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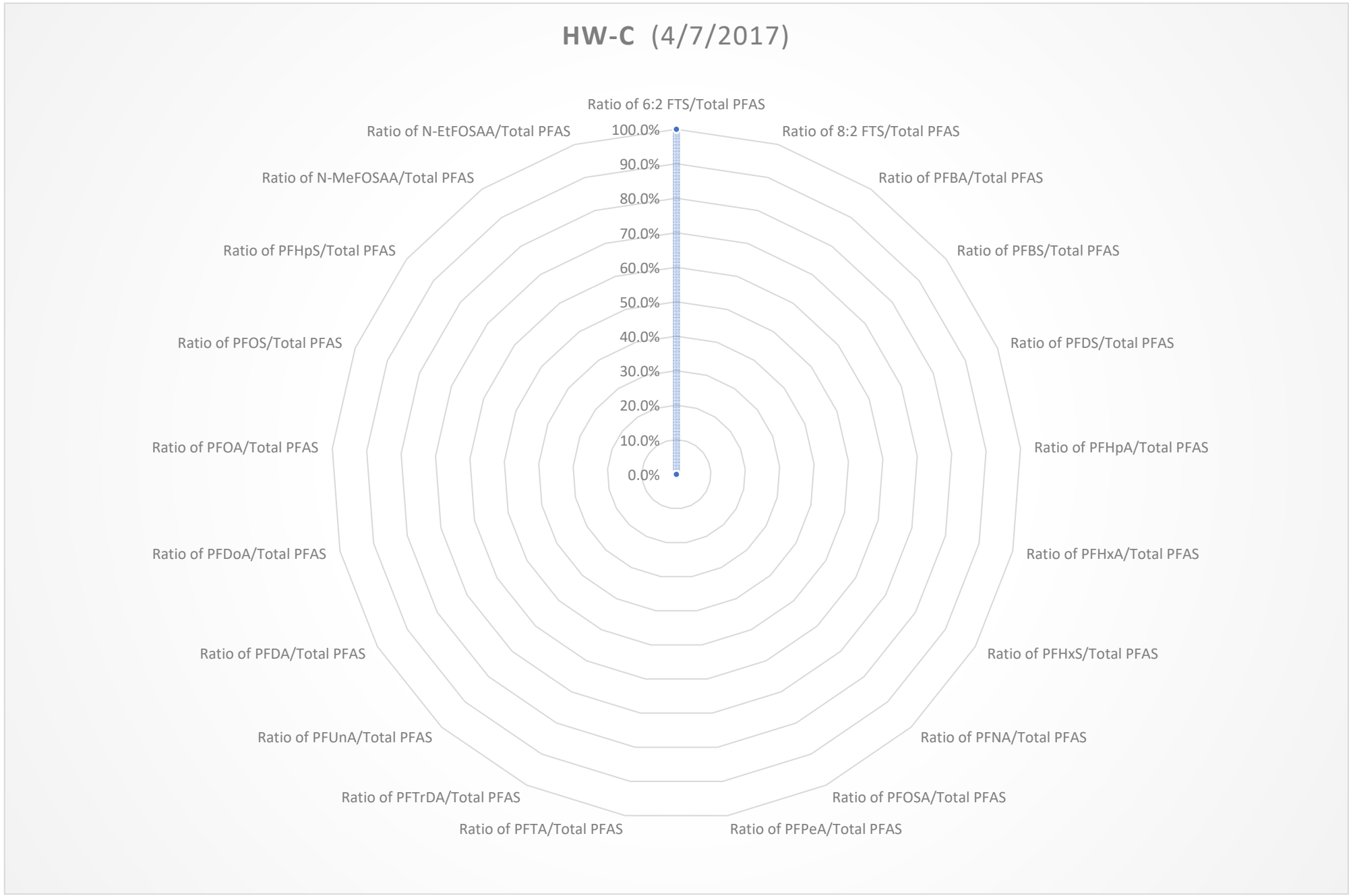
HW-C (4/7/2017)
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Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
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Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
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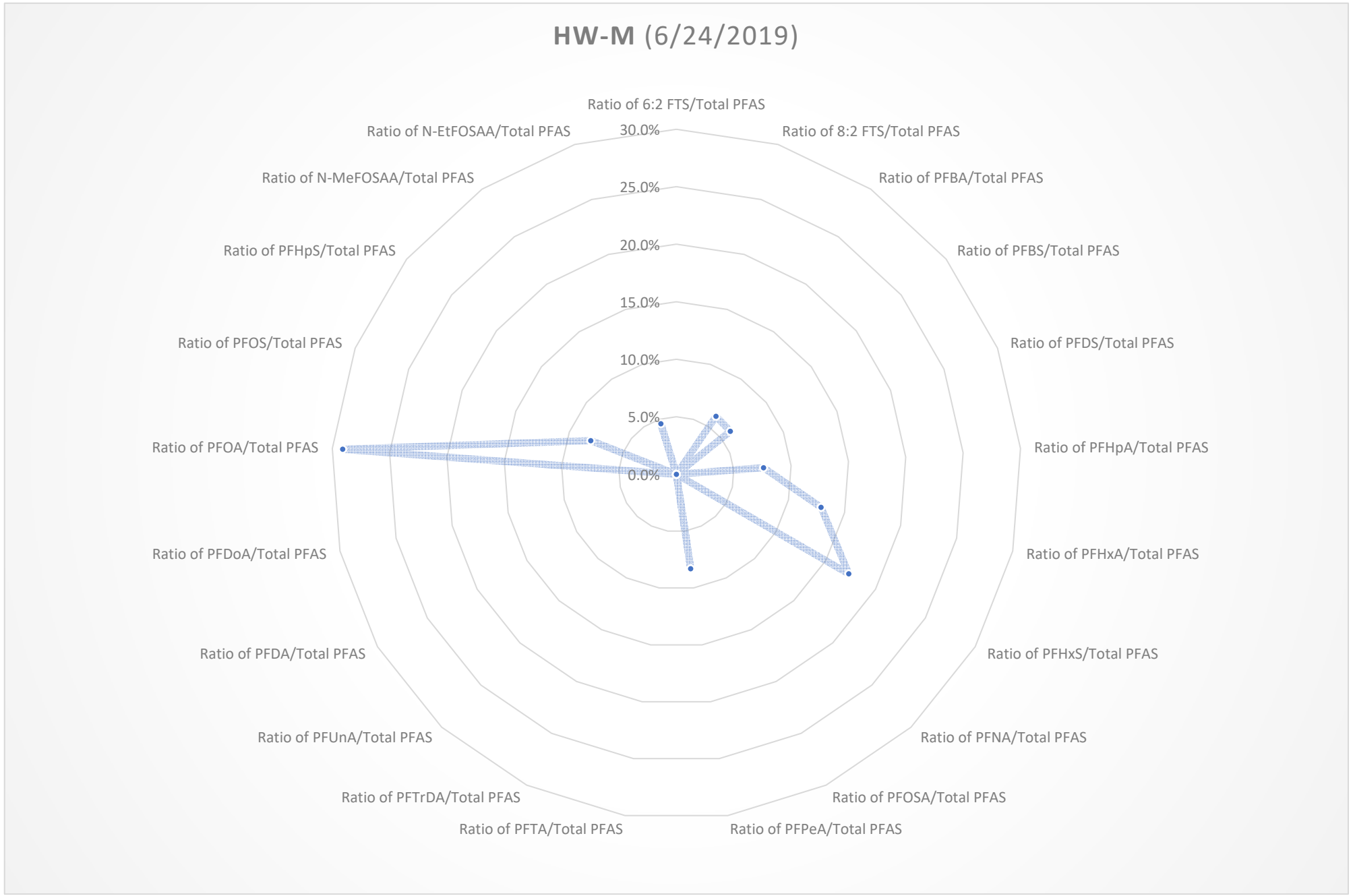
HW-M (6/24/2019)
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Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
Ratio of PFDS/Total PFAS
Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
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Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
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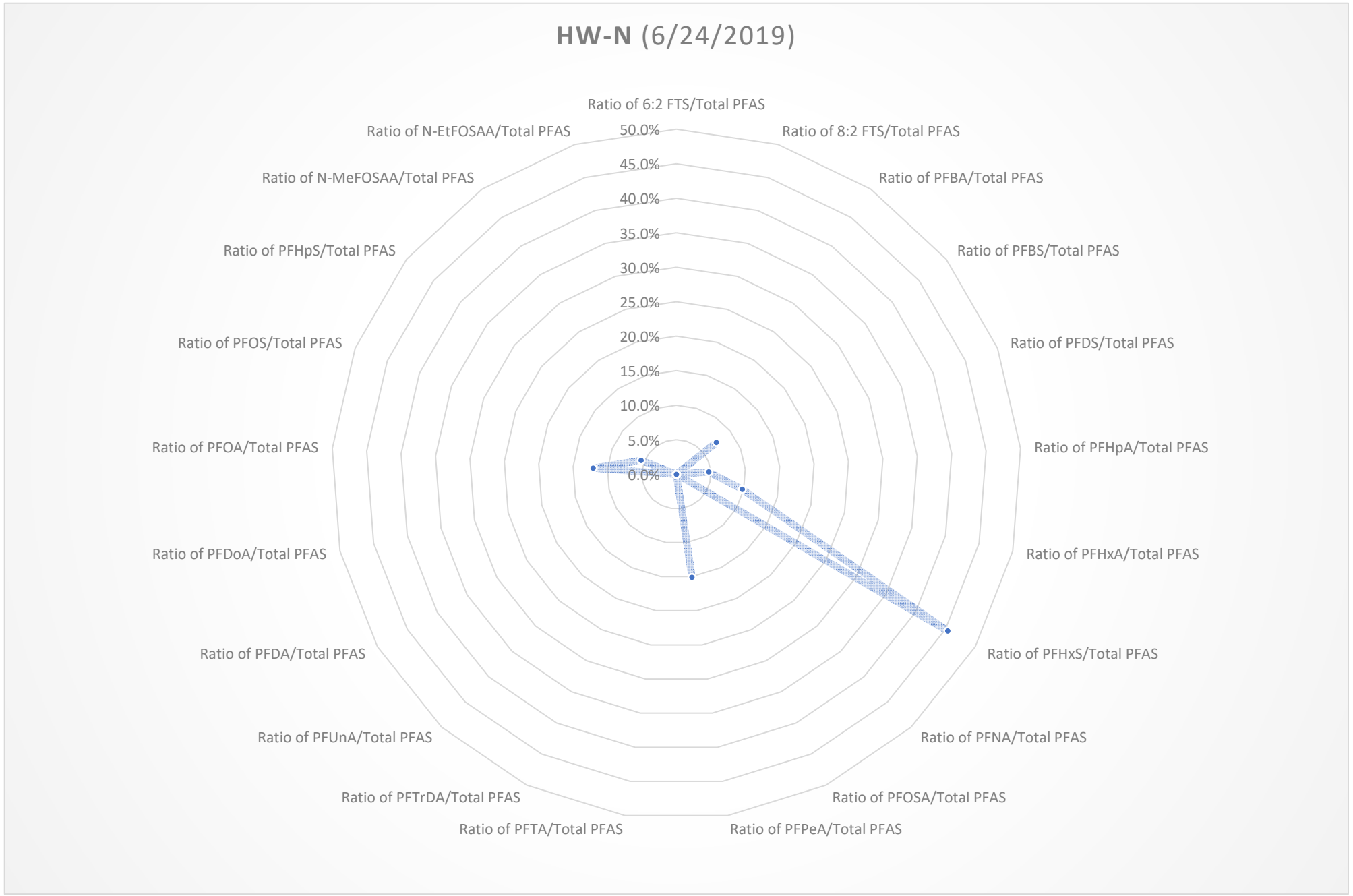
HW-N (6/24/2019)
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Ratio of 8:2 FTS/Total PFAS
Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
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Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
50.0%
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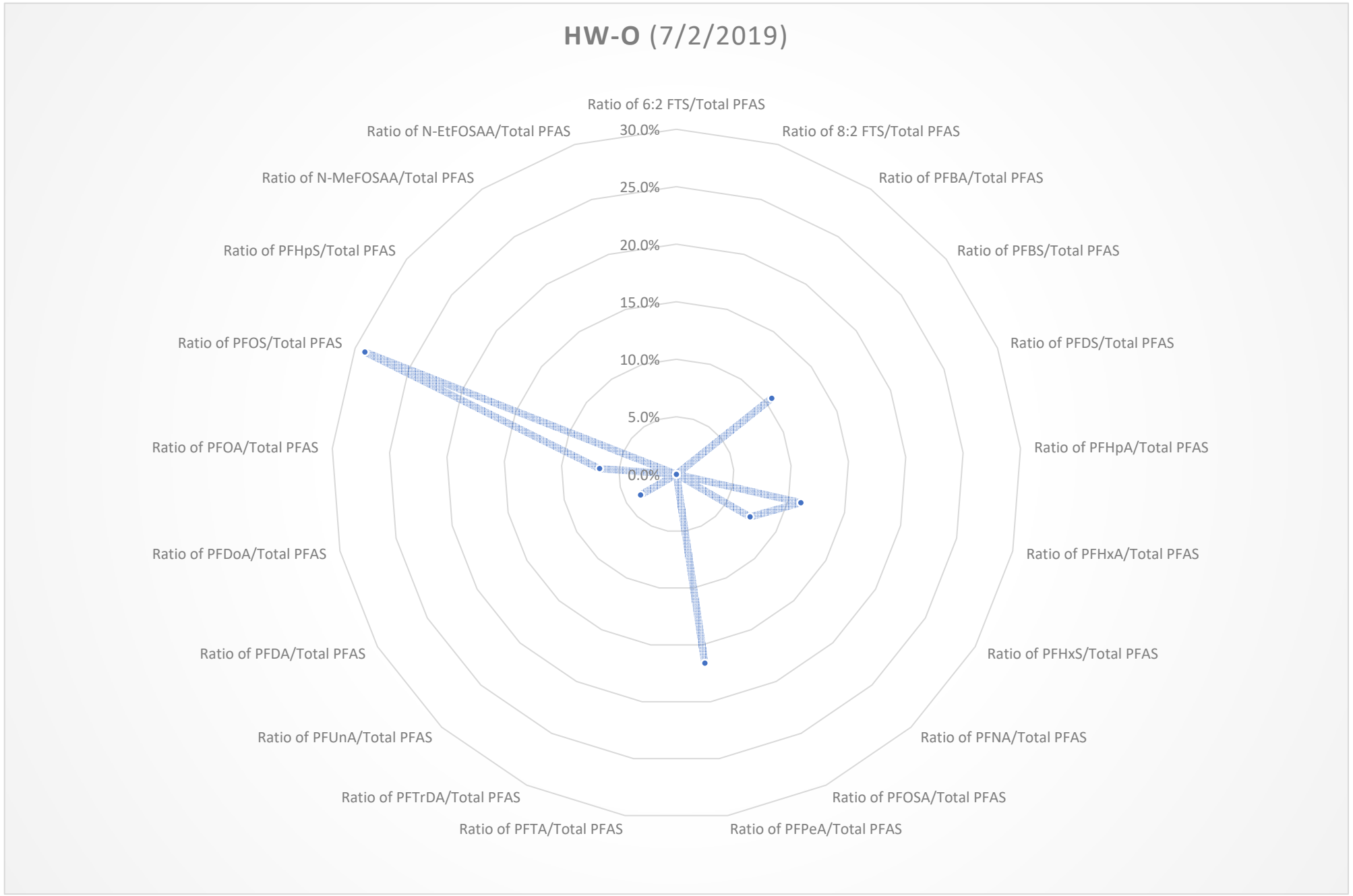
HW-O (7/2/2019)
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Ratio of 8:2 FTS/Total PFAS
Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
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Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
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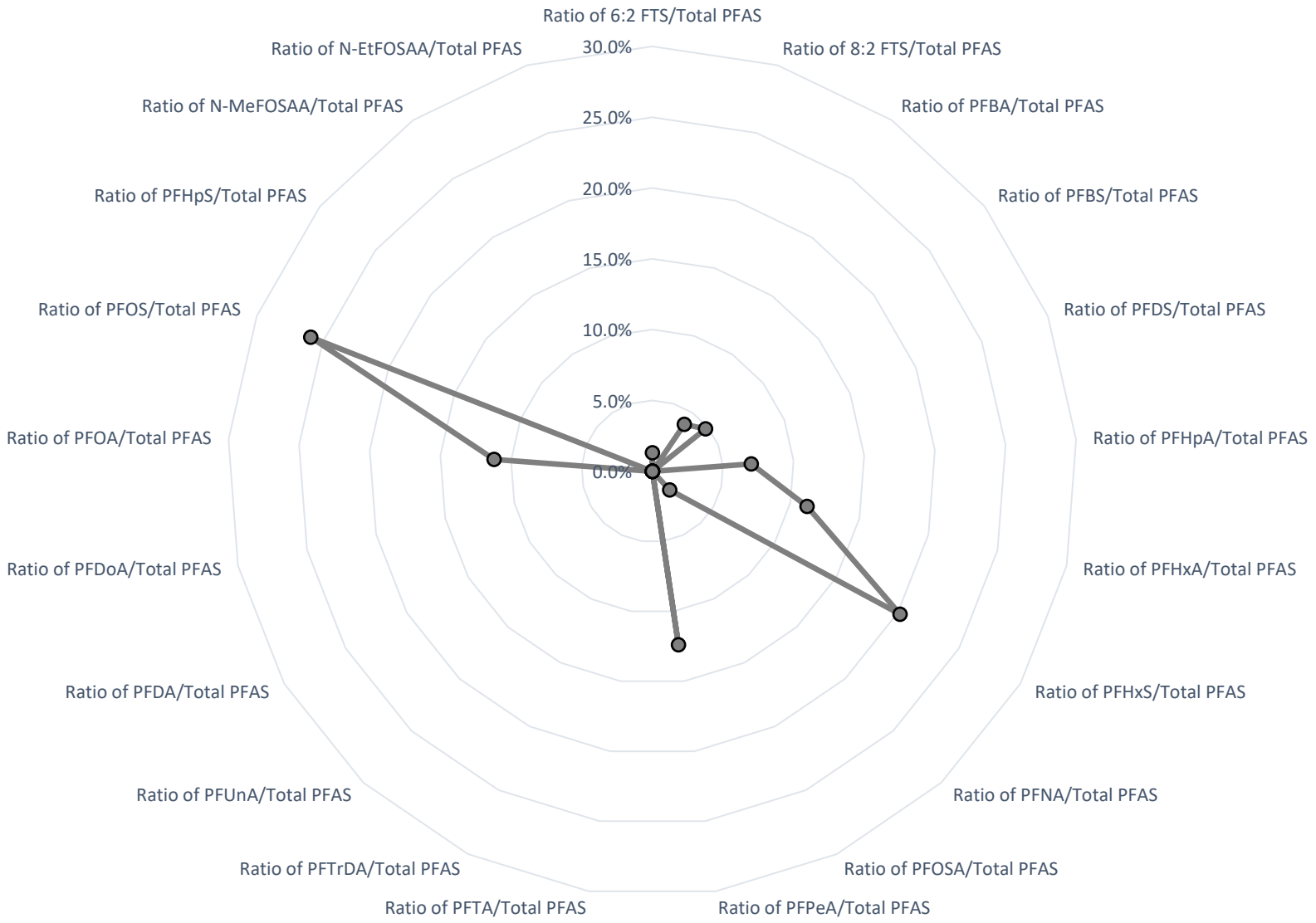
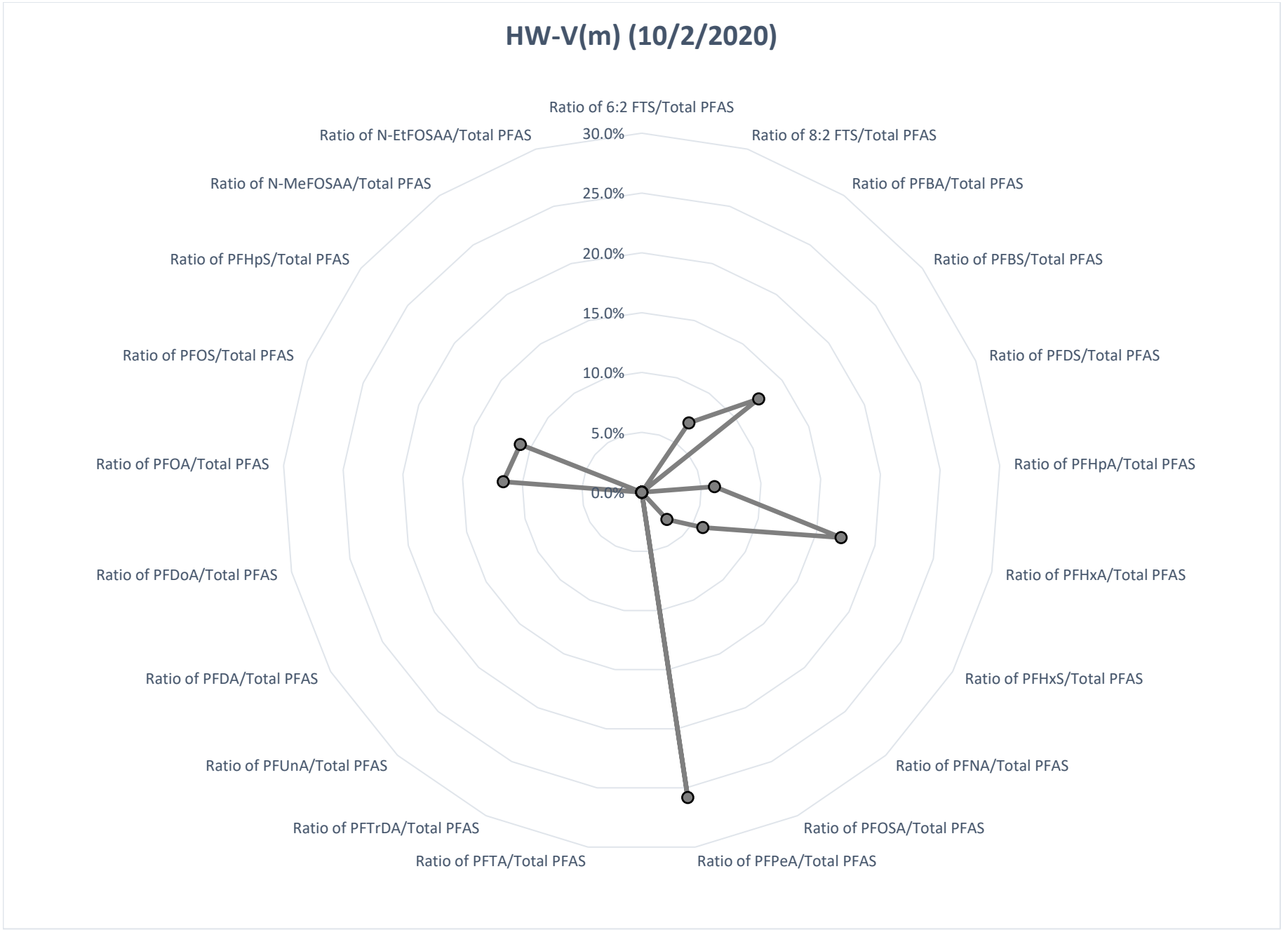
HW-U(d) (10/1/2020)

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Ratio of PFBS/Total PFAS
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Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
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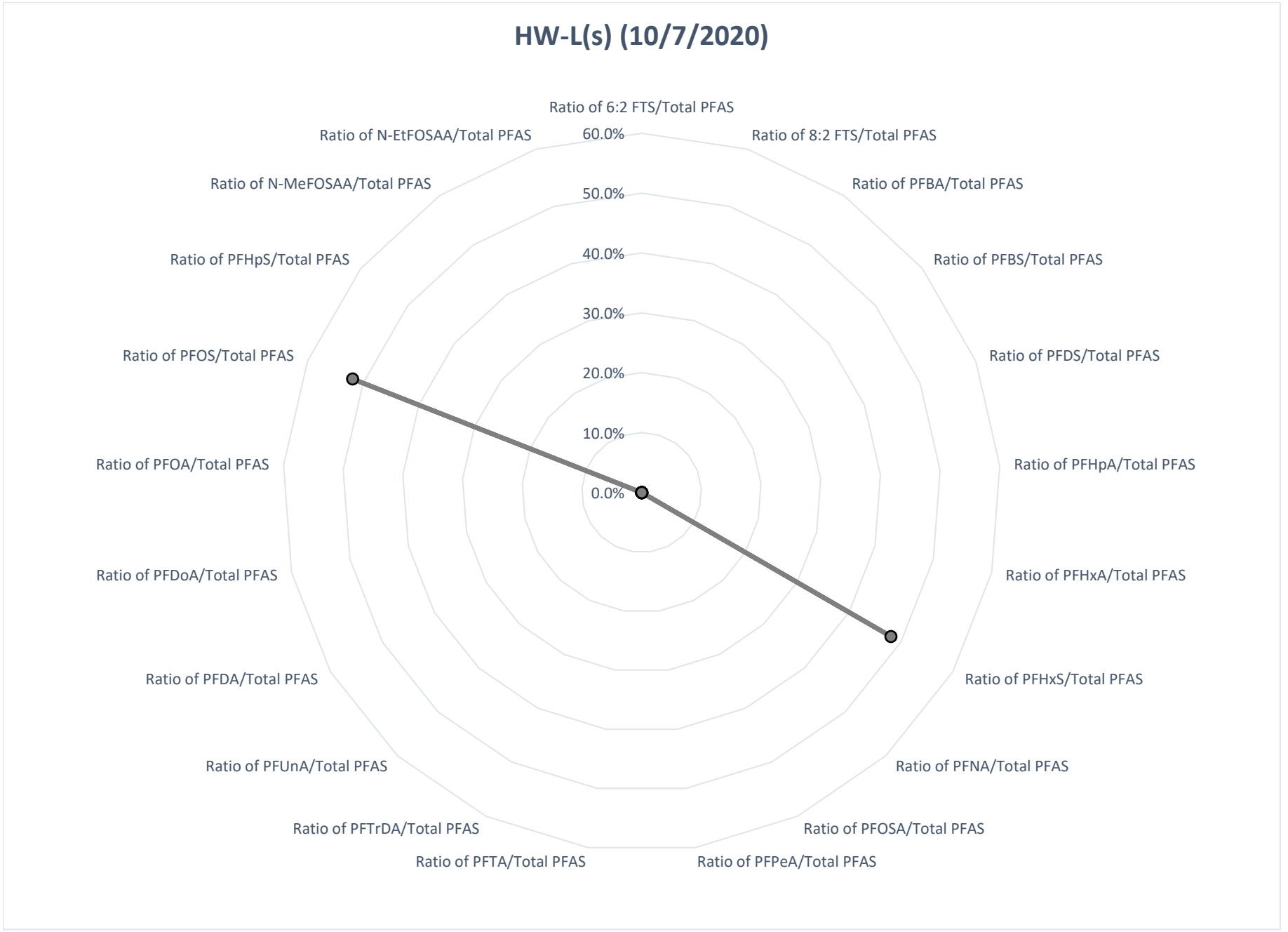
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Ratio of 8:2 FTS/Total PFAS
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Ratio of PFBS/Total PFAS
Ratio of PFDS/Total PFAS
Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
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30.0%
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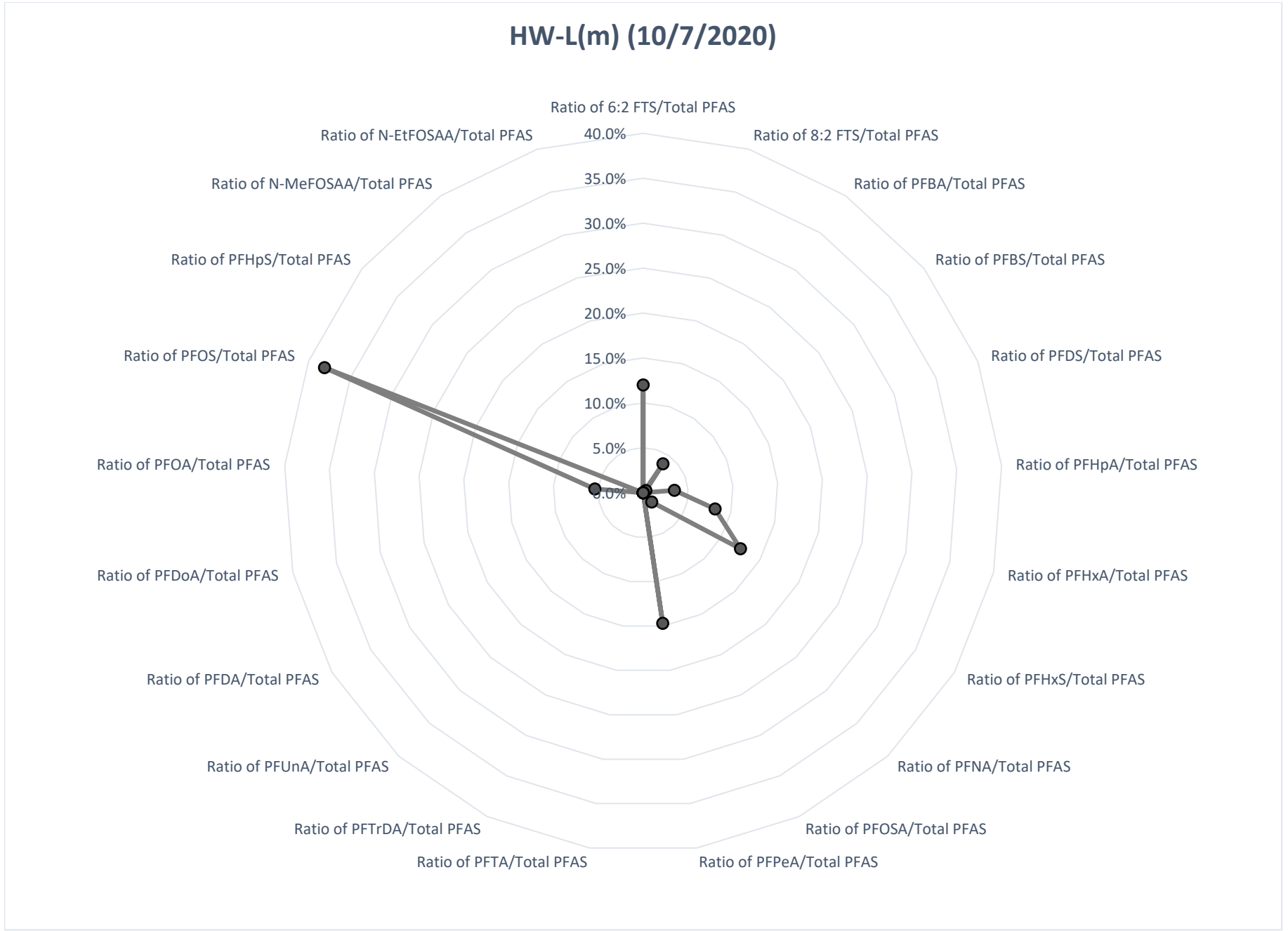
10.0%
0.0%


HW-L(m) (10/7/2020)
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Ratio of 8:2 FTS/Total PFAS
Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
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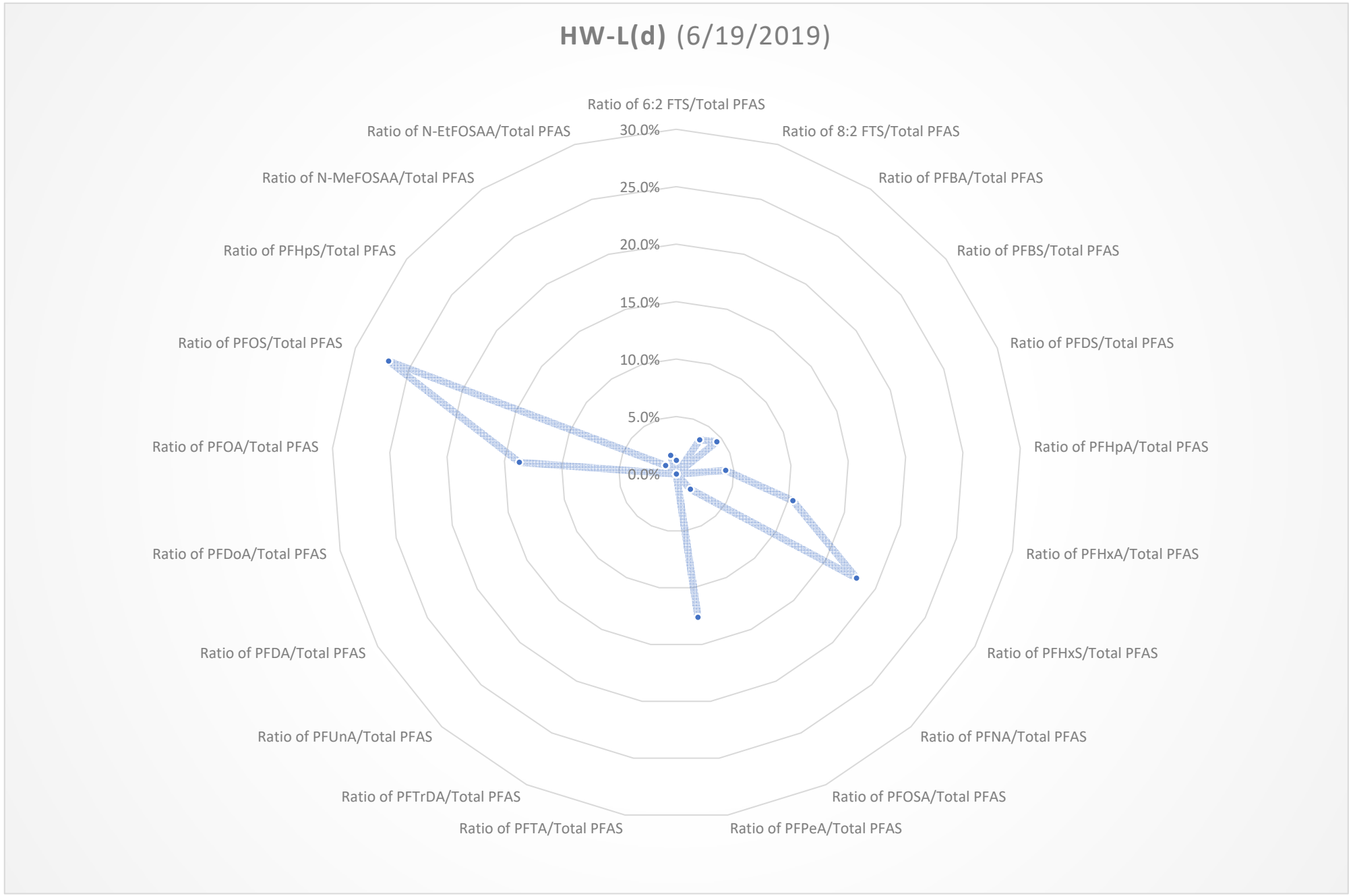
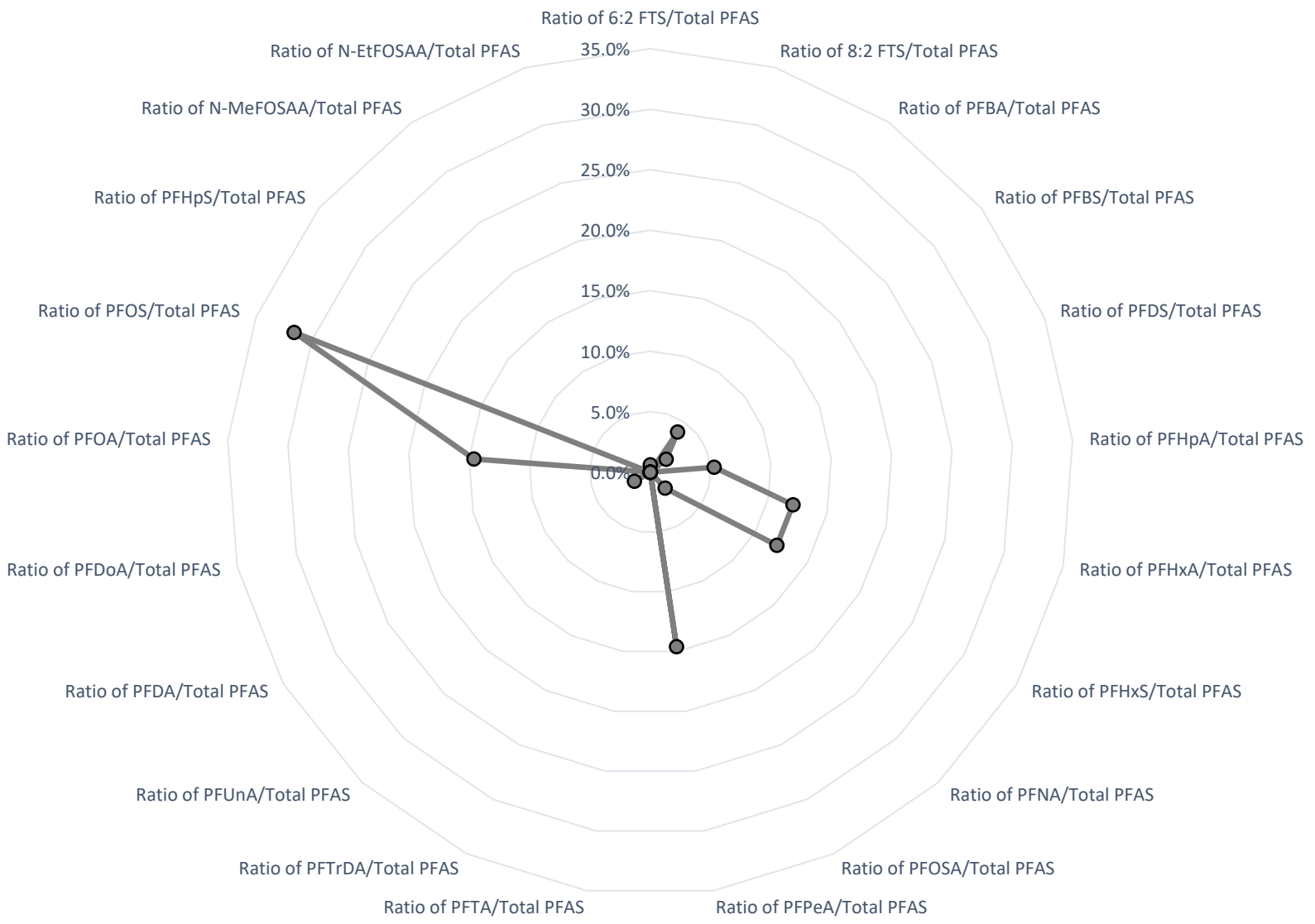
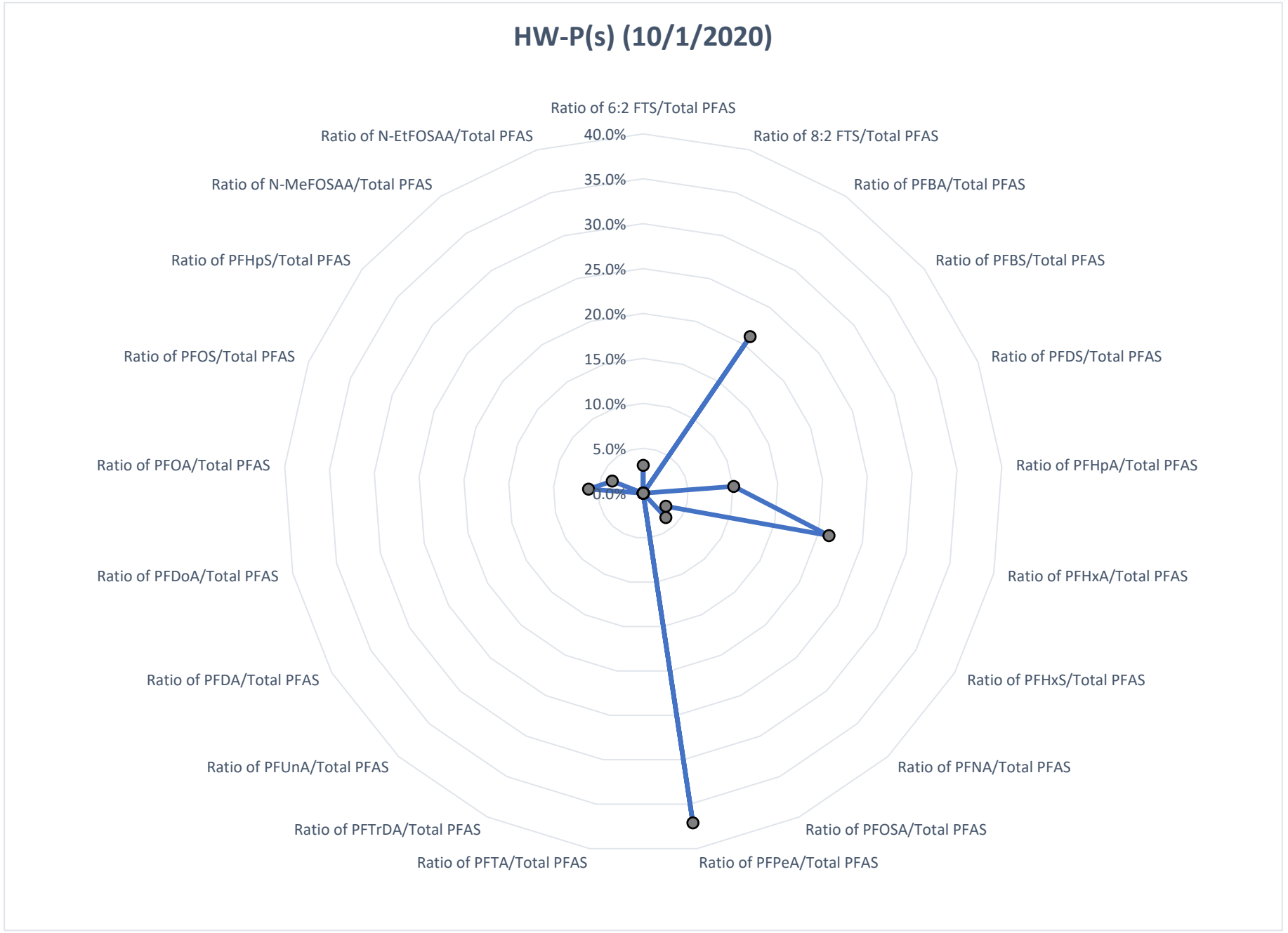
Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
40.0%
35.0%
30.0%
25.0%
20.0%
15.0%
10.0%
5.0%
0.0%

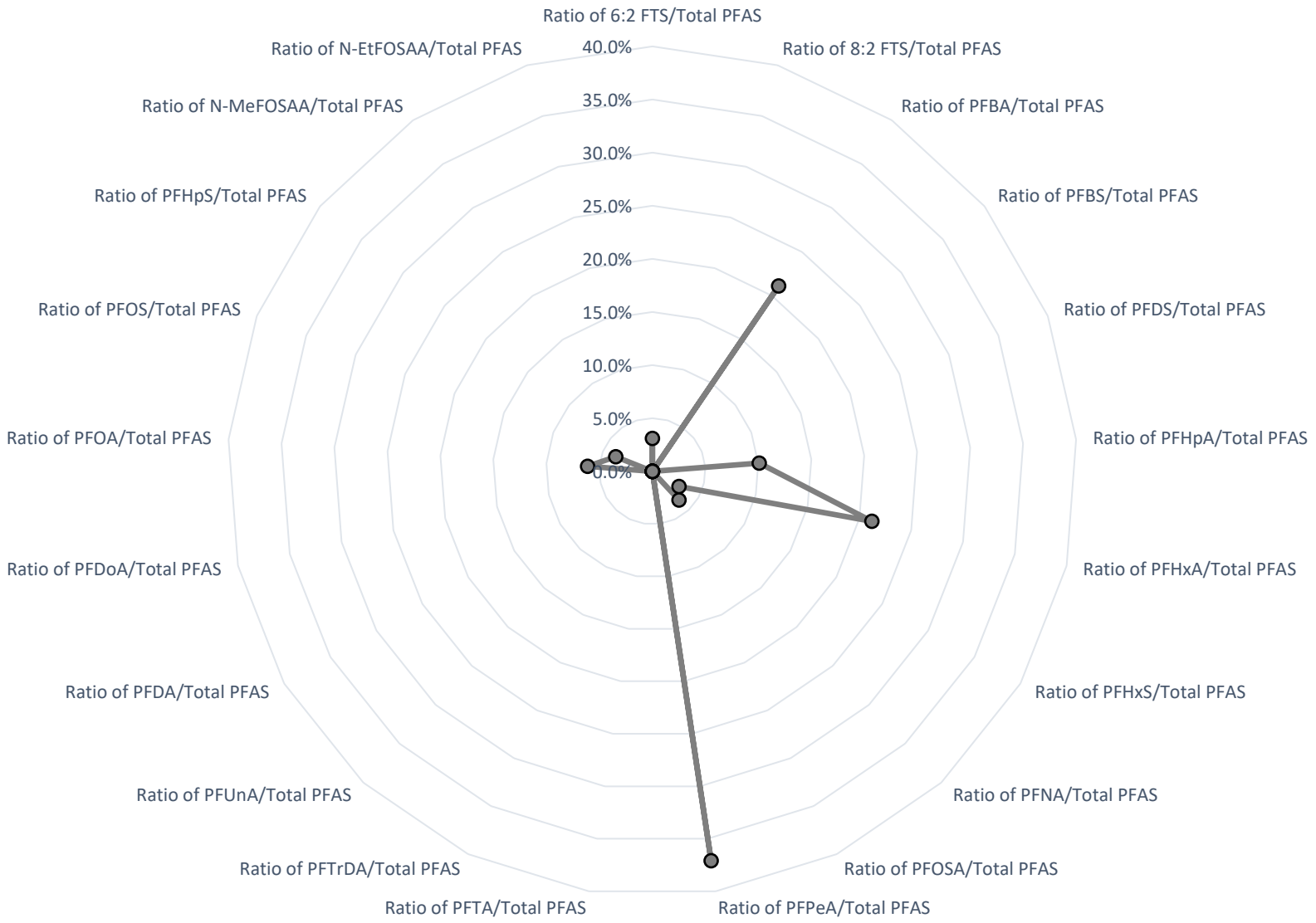

HW-L(d) (6/19/2019)
Ratio of 6:2 FTS/Total PFAS
Ratio of 8:2 FTS/Total PFAS
Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
Ratio of PFDS/Total PFAS
Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
30.0%
25.0%
20.0%
15.0%
10.0%
5.0%
0.0%

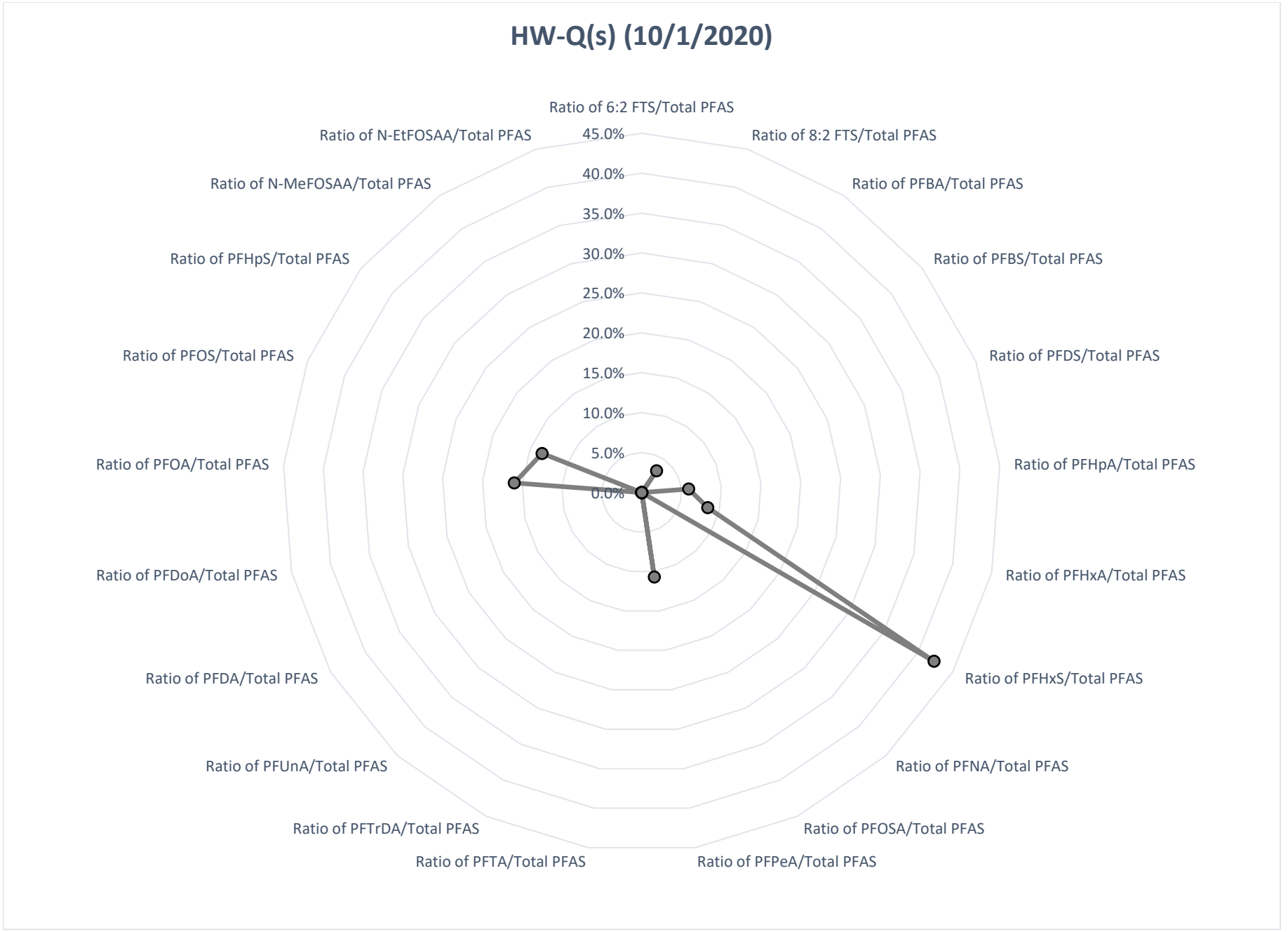
HW-L(d) (10/7/2020)

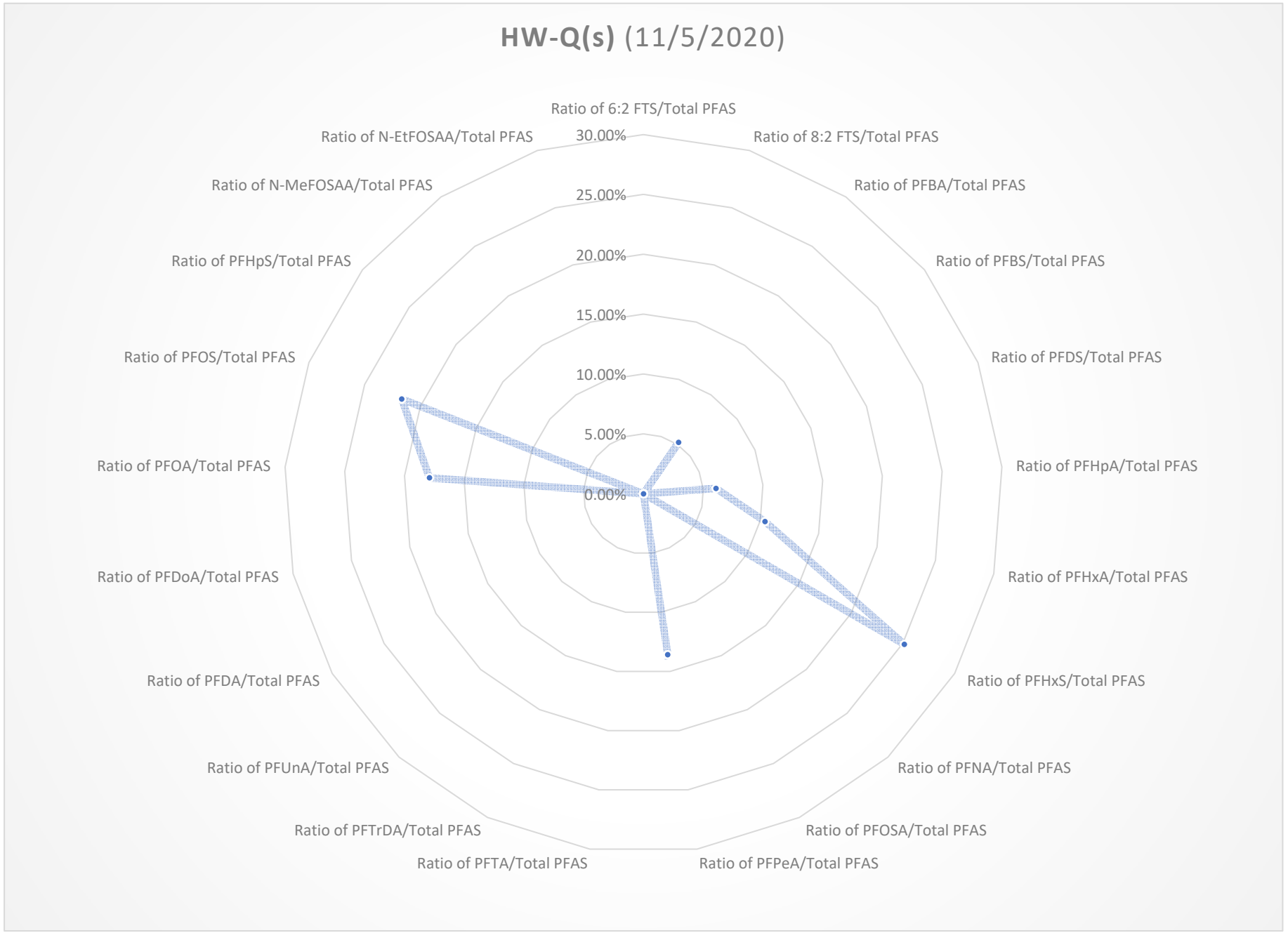


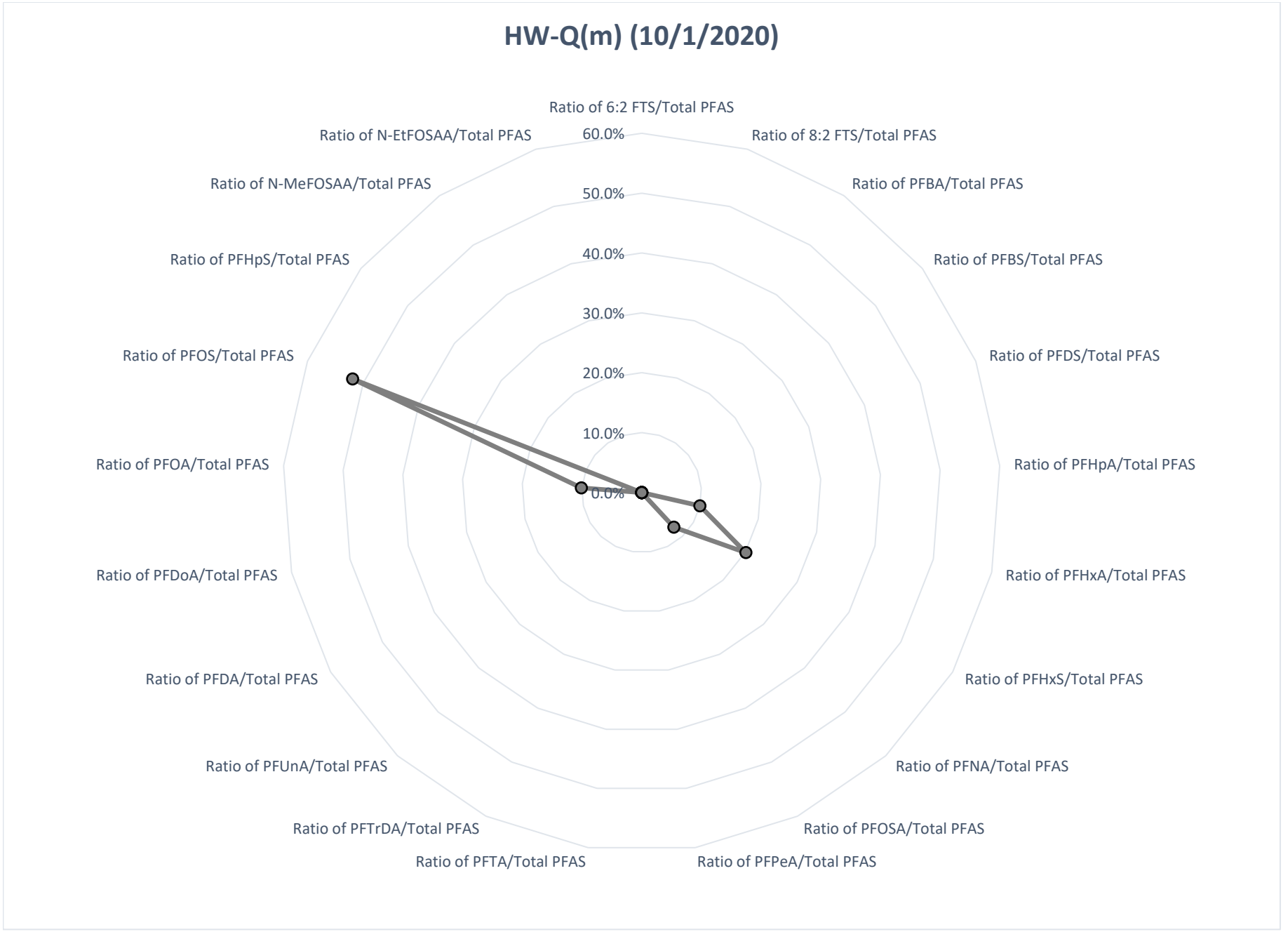

HW-P(s) (10/1/2020)
Ratio of 6:2 FTS/Total PFAS
Ratio of 8:2 FTS/Total PFAS
Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
Ratio of PFDS/Total PFAS
Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
40.0%
35.0%
30.0%
25.0%
20.0%
15.0%
10.0%
5.0%
0.0%

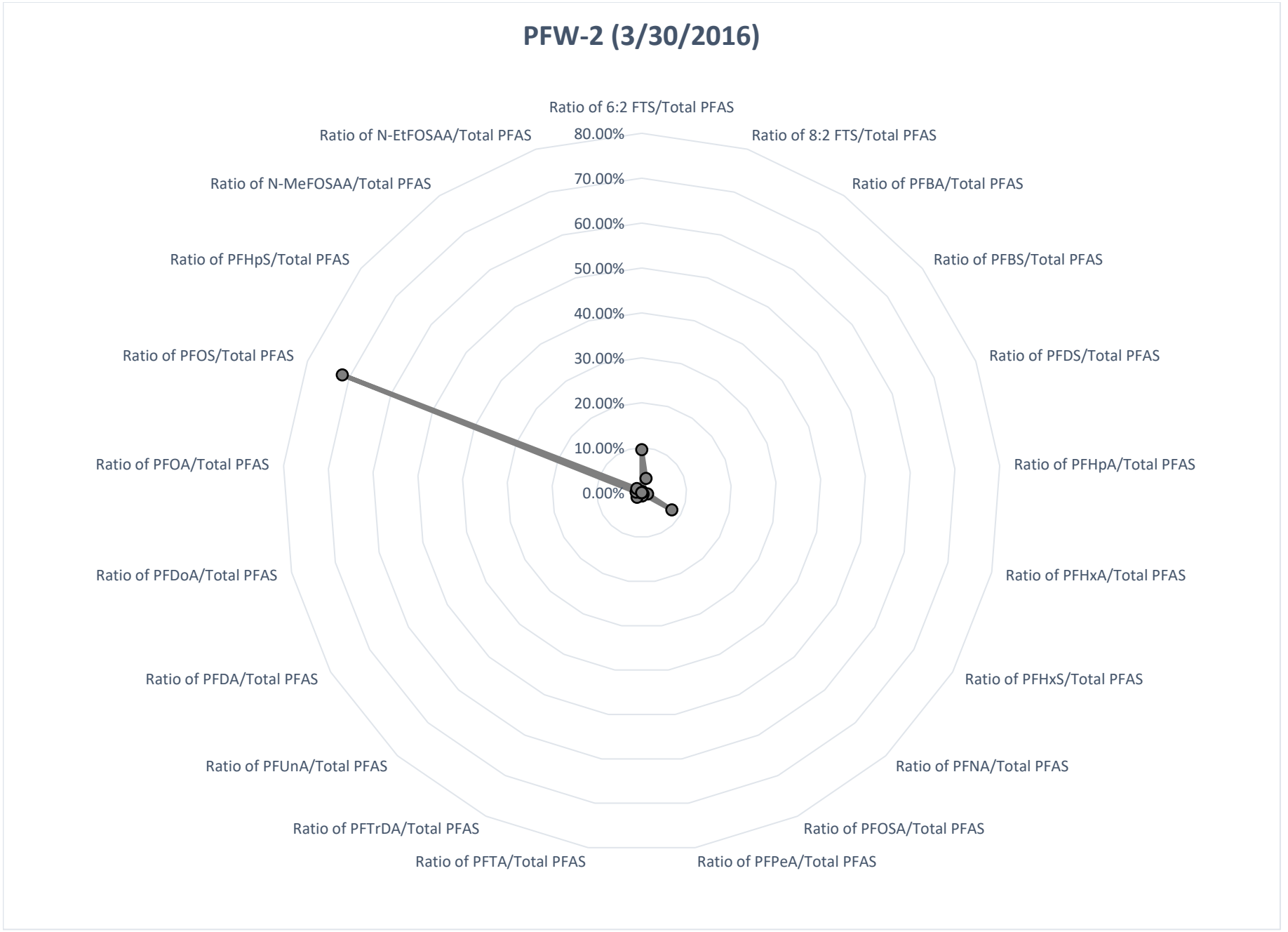
HW-P(m) (10/1/2020)

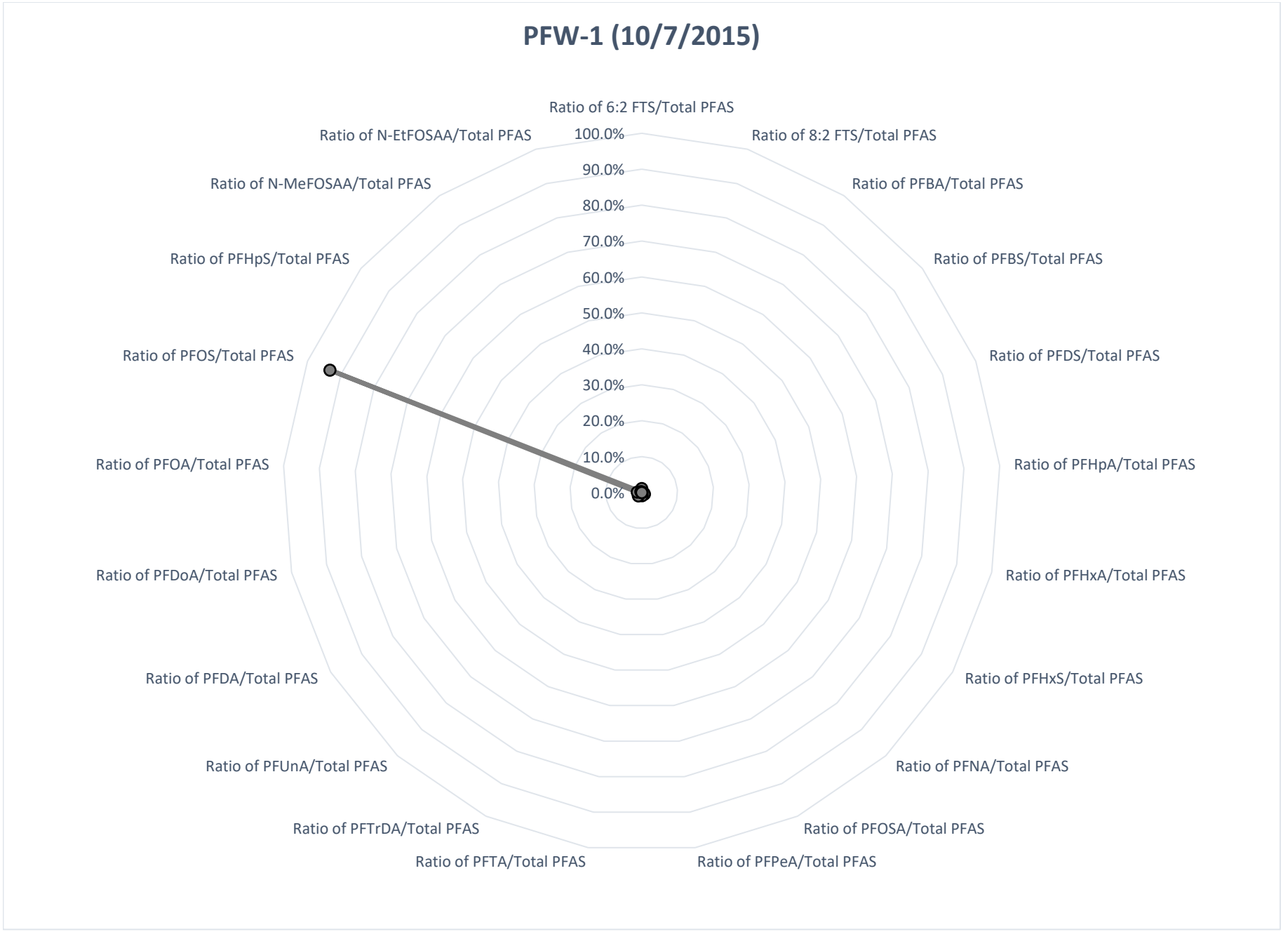


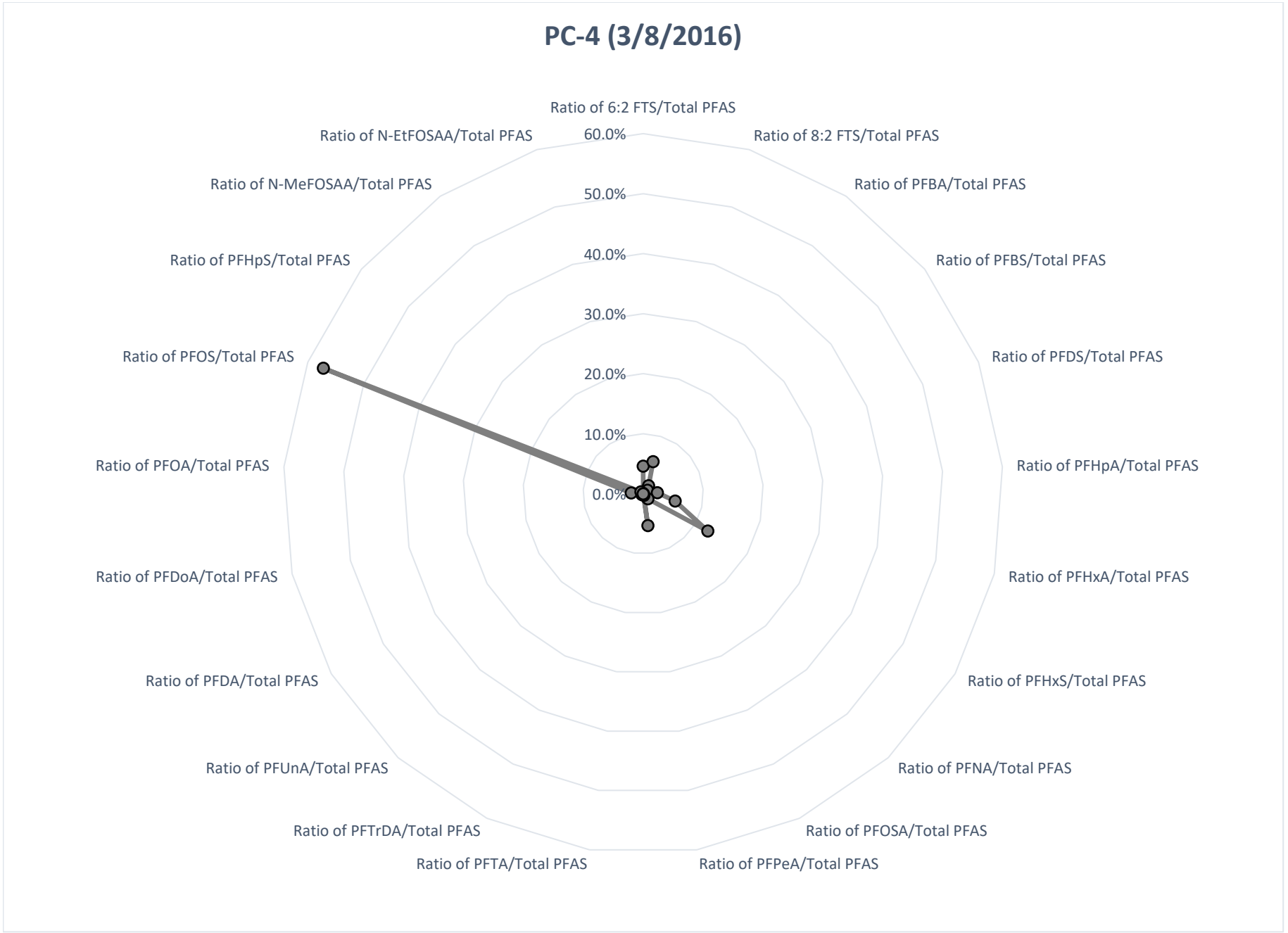

HW-Q(s) (10/1/2020)
Ratio of 6:2 FTS/Total PFAS
Ratio of 8:2 FTS/Total PFAS
Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
Ratio of PFDS/Total PFAS
Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
45.0%
40.0%
35.0%
30.0%
25.0%
20.0%
15.0%
10.0%
5.0%
0.0%

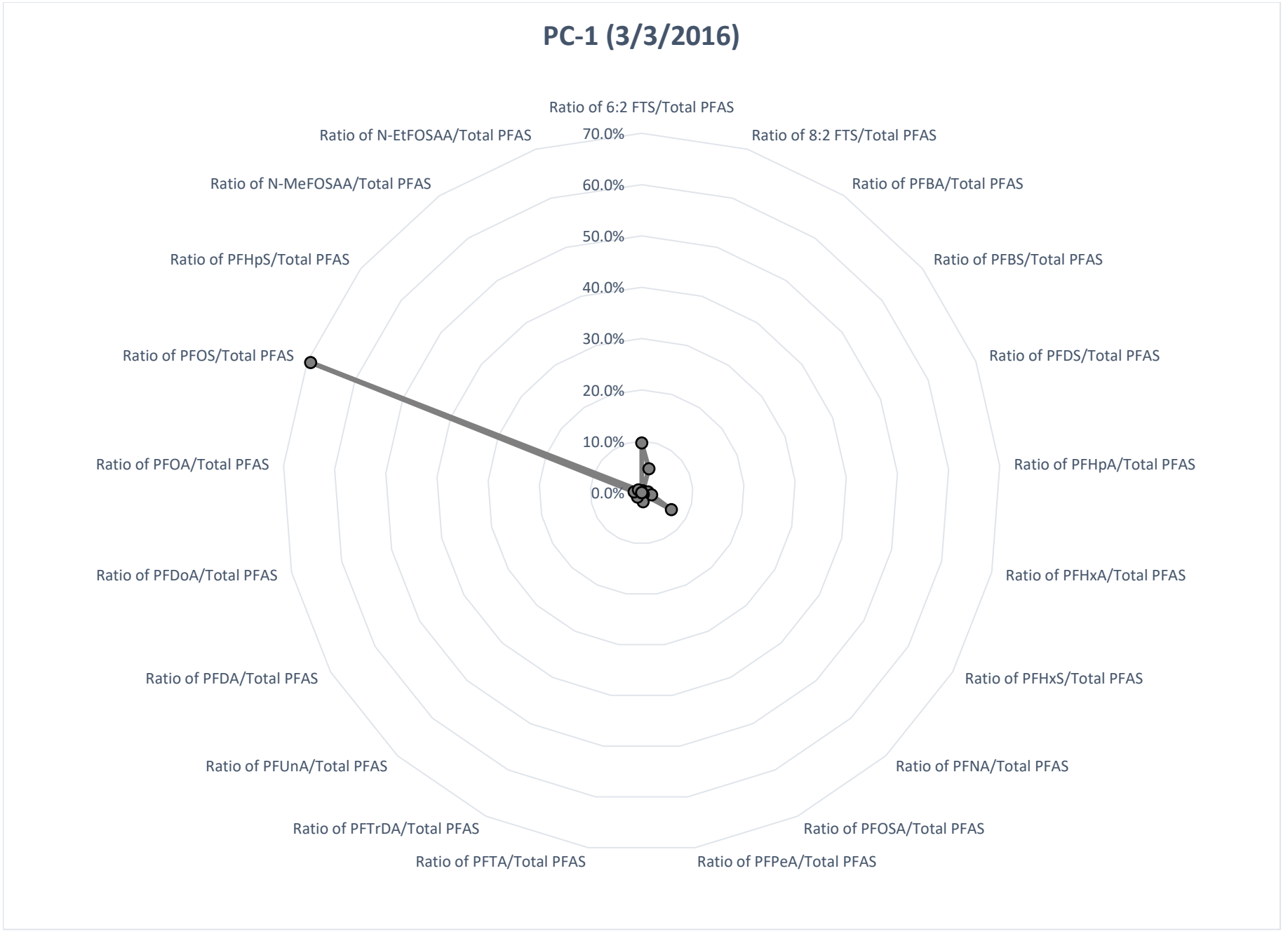

HW-Q(s) (11/5/2020)
Ratio of 6:2 FTS/Total PFAS
Ratio of 8:2 FTS/Total PFAS
Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
Ratio of PFDS/Total PFAS
Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
30.00%
25.00%
20.00%
15.00%
10.00%
5.00%
0.00%

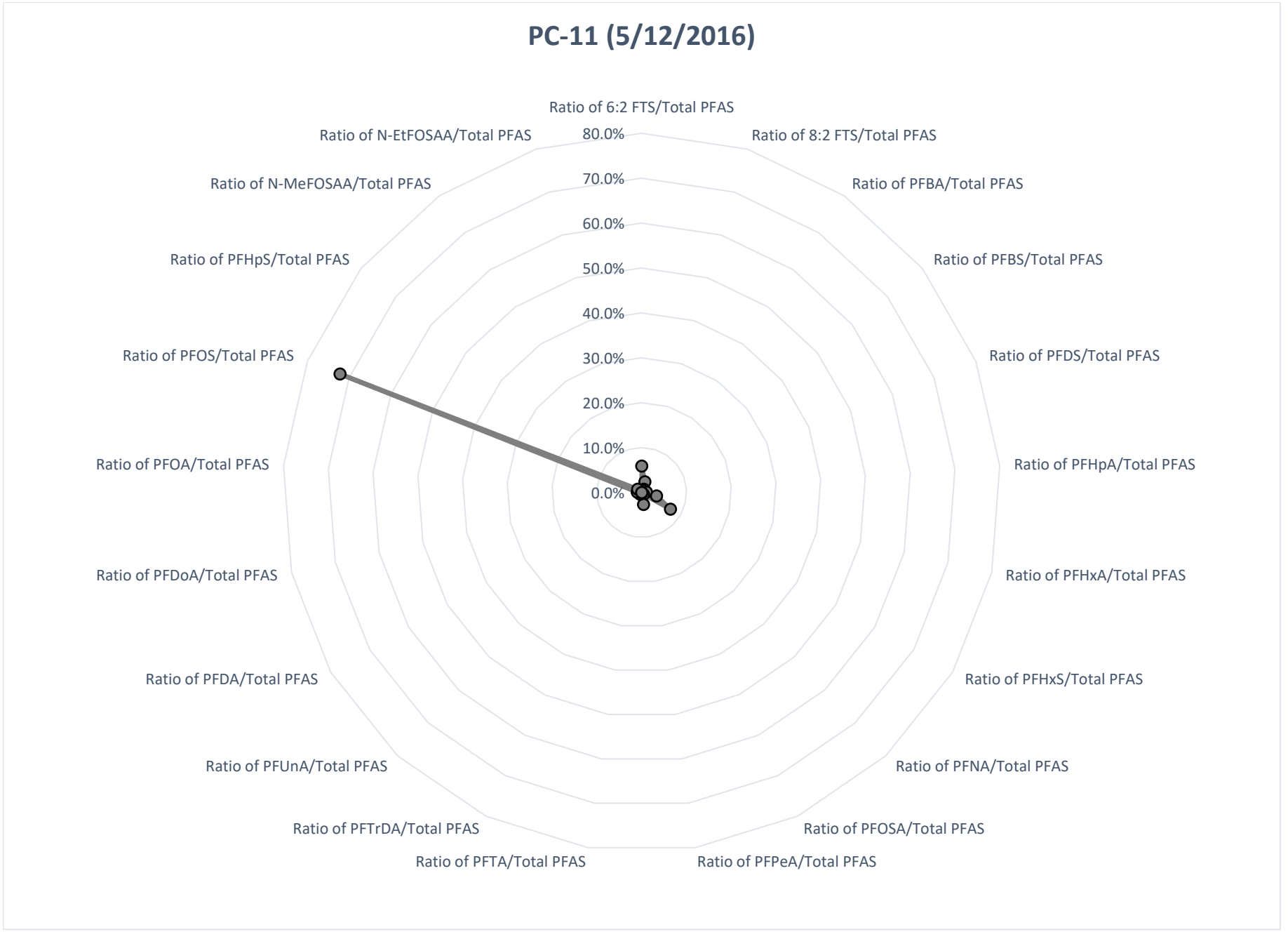

HW-Q(m) (10/1/2020)
Ratio of 6:2 FTS/Total PFAS
Ratio of 8:2 FTS/Total PFAS
Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
Ratio of PFDS/Total PFAS
Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%

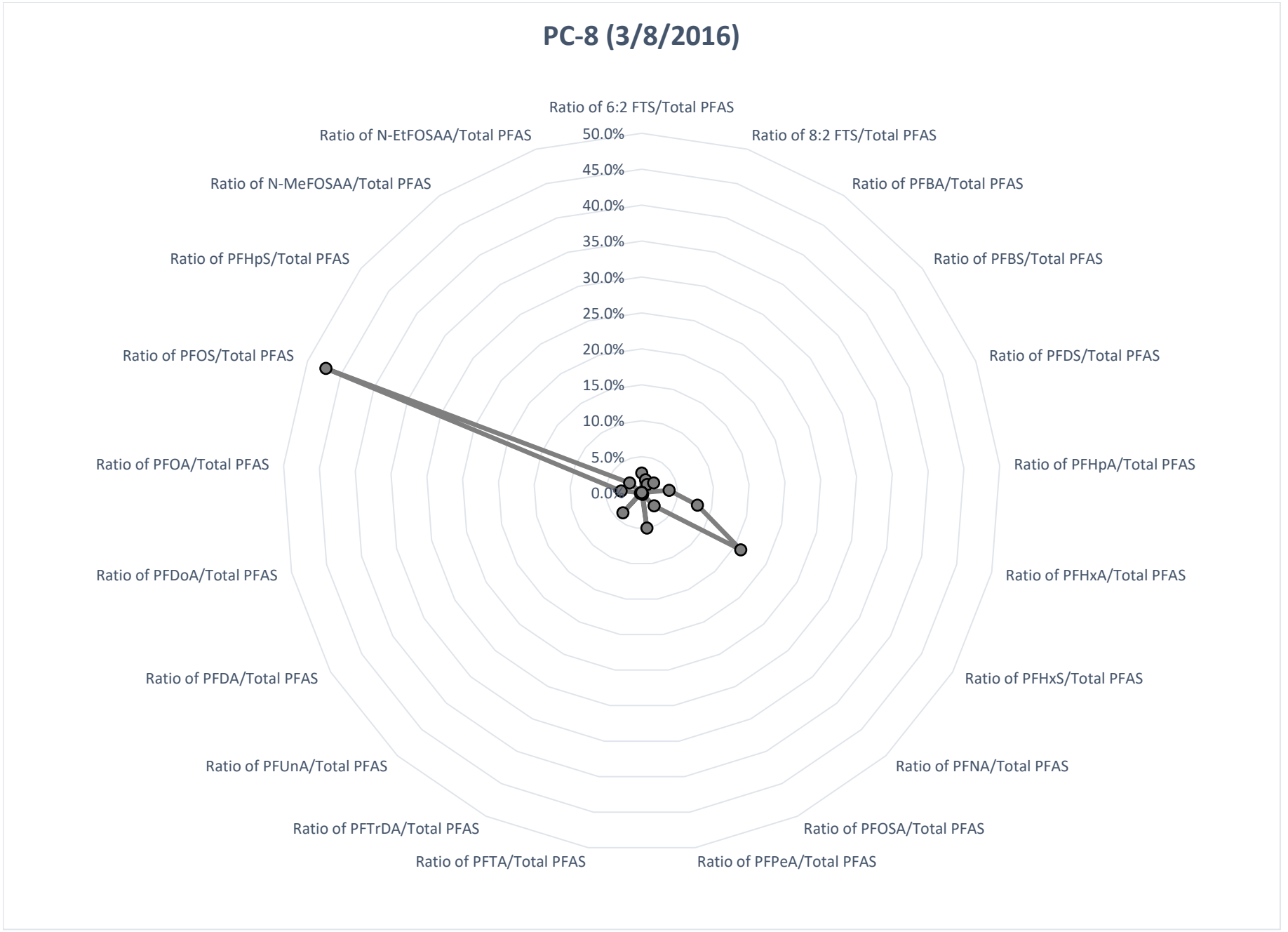

PFW-2 (3/30/2016)
Ratio of 6:2 FTS/Total PFAS
Ratio of 8:2 FTS/Total PFAS
Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
Ratio of PFDS/Total PFAS
Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
80.00%
70.00%
60.00%
50.00%
40.00%
30.00%
20.00%
10.00%
0.00%

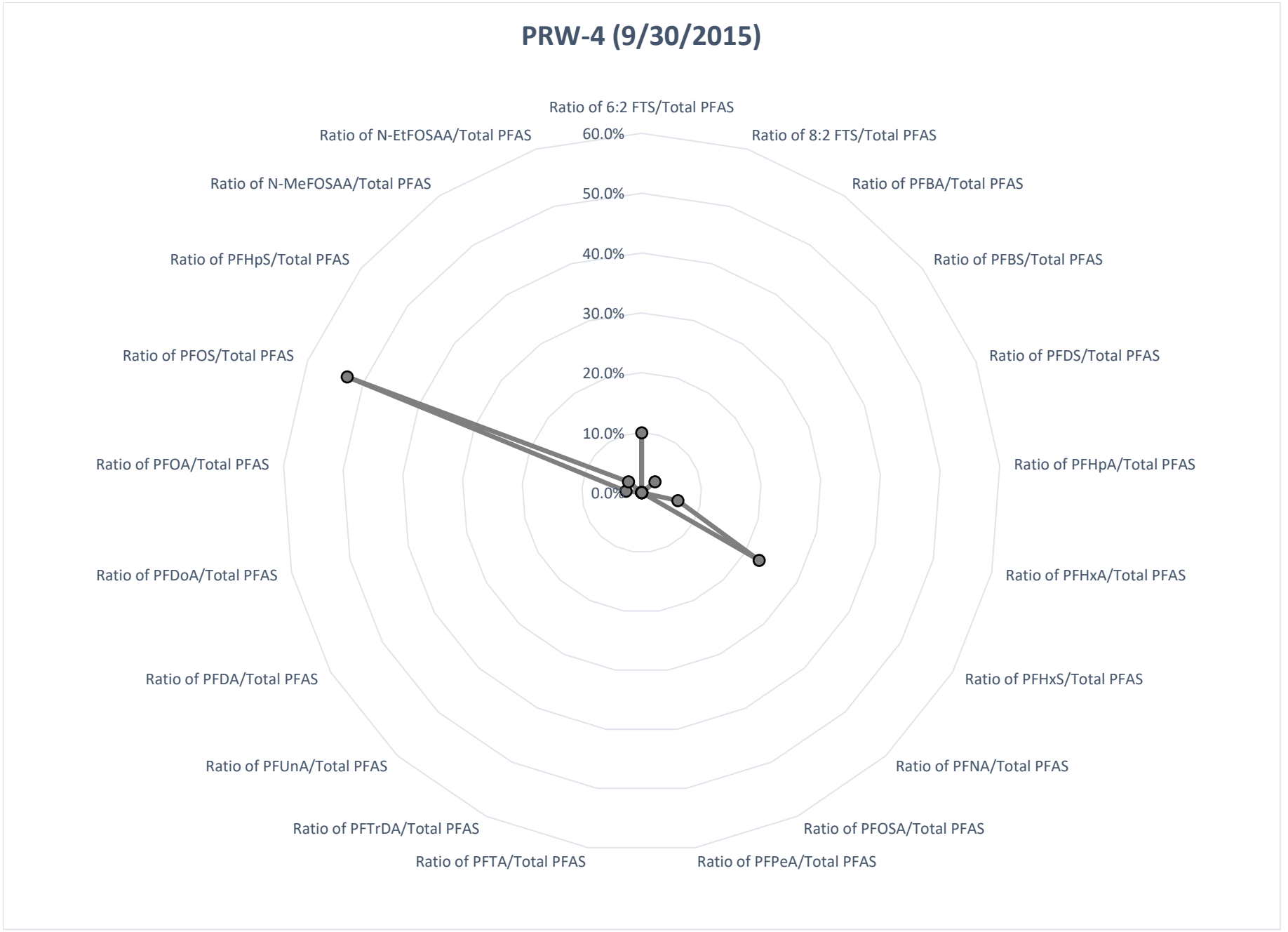

PFW-1 (10/7/2015)
Ratio of 6:2 FTS/Total PFAS
Ratio of 8:2 FTS/Total PFAS
Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
Ratio of PFDS/Total PFAS
Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
100.0%
90.0%
80.0%
70.0%
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%

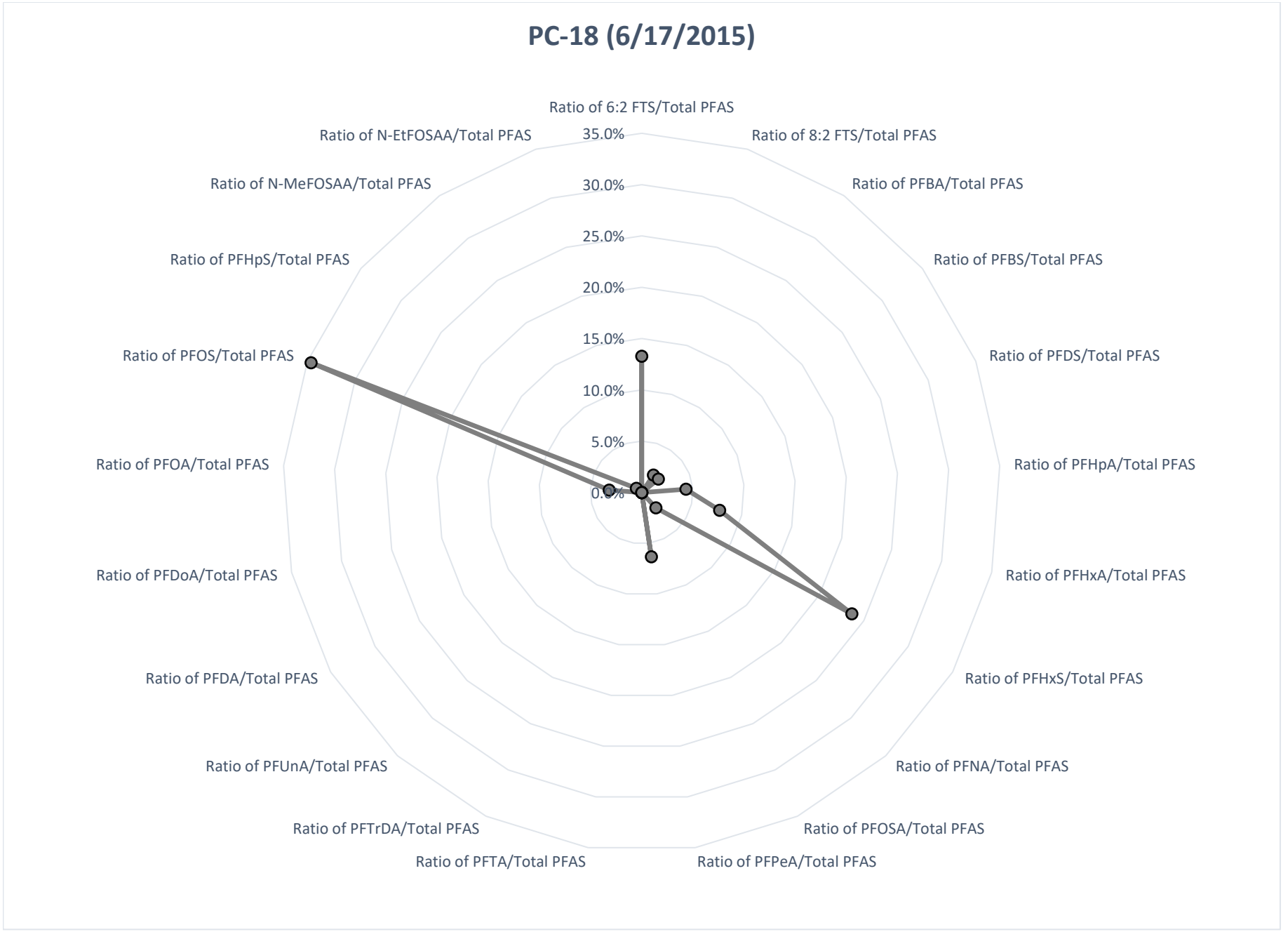

PC-4 (3/8/2016)
Ratio of 6:2 FTS/Total PFAS
Ratio of 8:2 FTS/Total PFAS
Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
Ratio of PFDS/Total PFAS
Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%

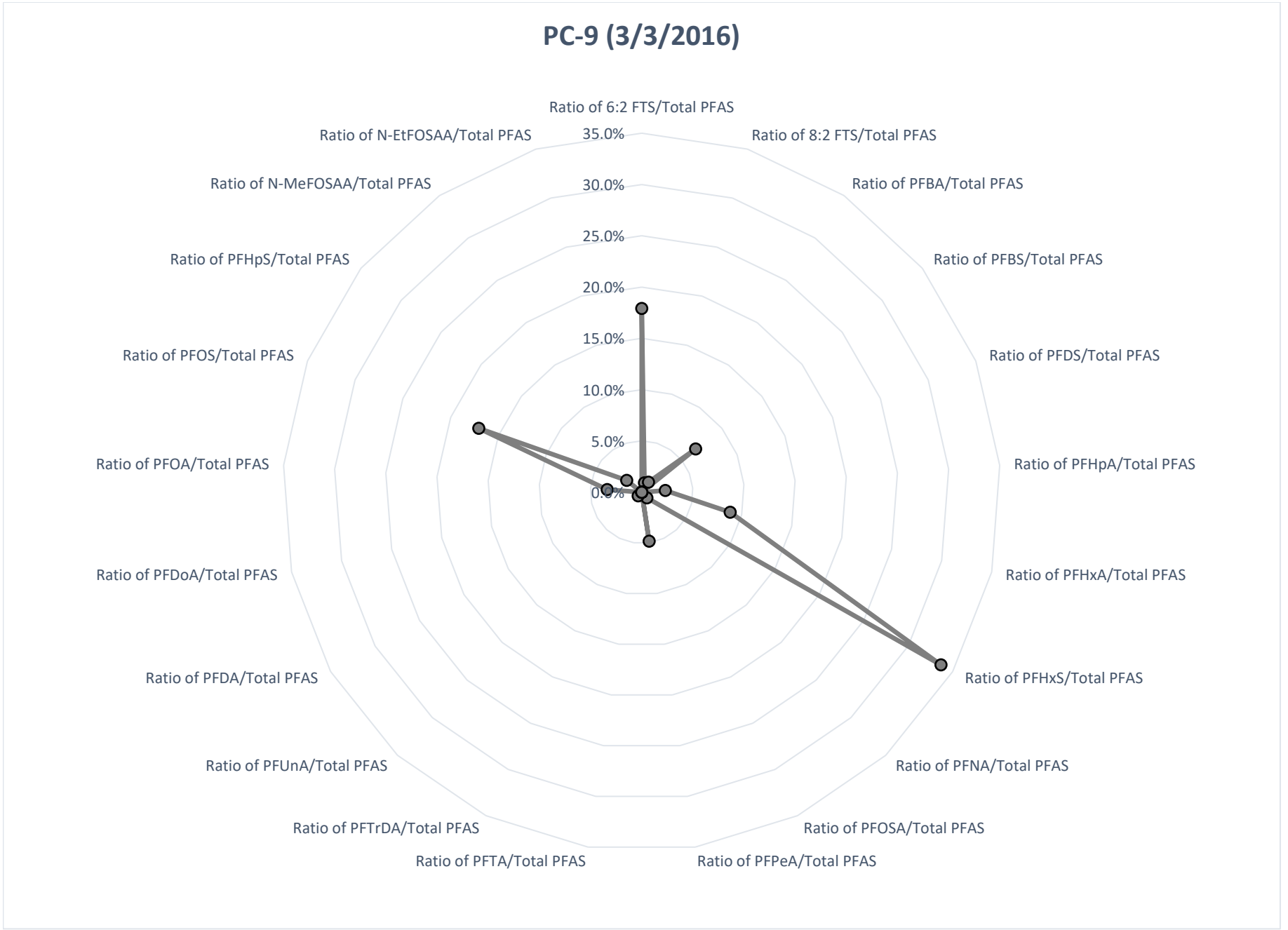

PC-1 (3/3/2016)
Ratio of 6:2 FTS/Total PFAS
Ratio of 8:2 FTS/Total PFAS
Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
Ratio of PFDS/Total PFAS
Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
70.0%
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%

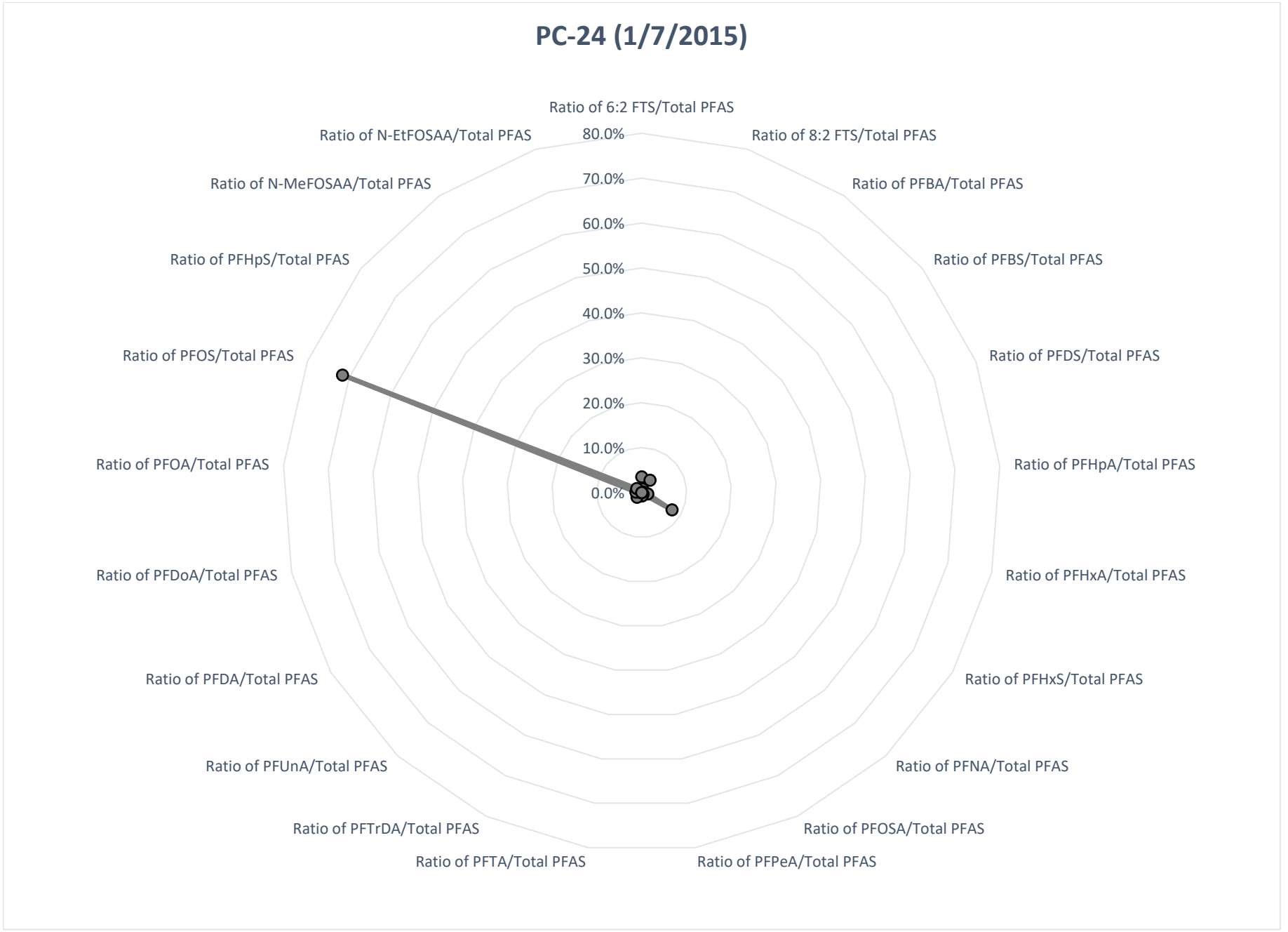

PC-11 (5/12/2016)
Ratio of 6:2 FTS/Total PFAS
Ratio of 8:2 FTS/Total PFAS
Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
Ratio of PFDS/Total PFAS
Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
80.0%
70.0%
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%

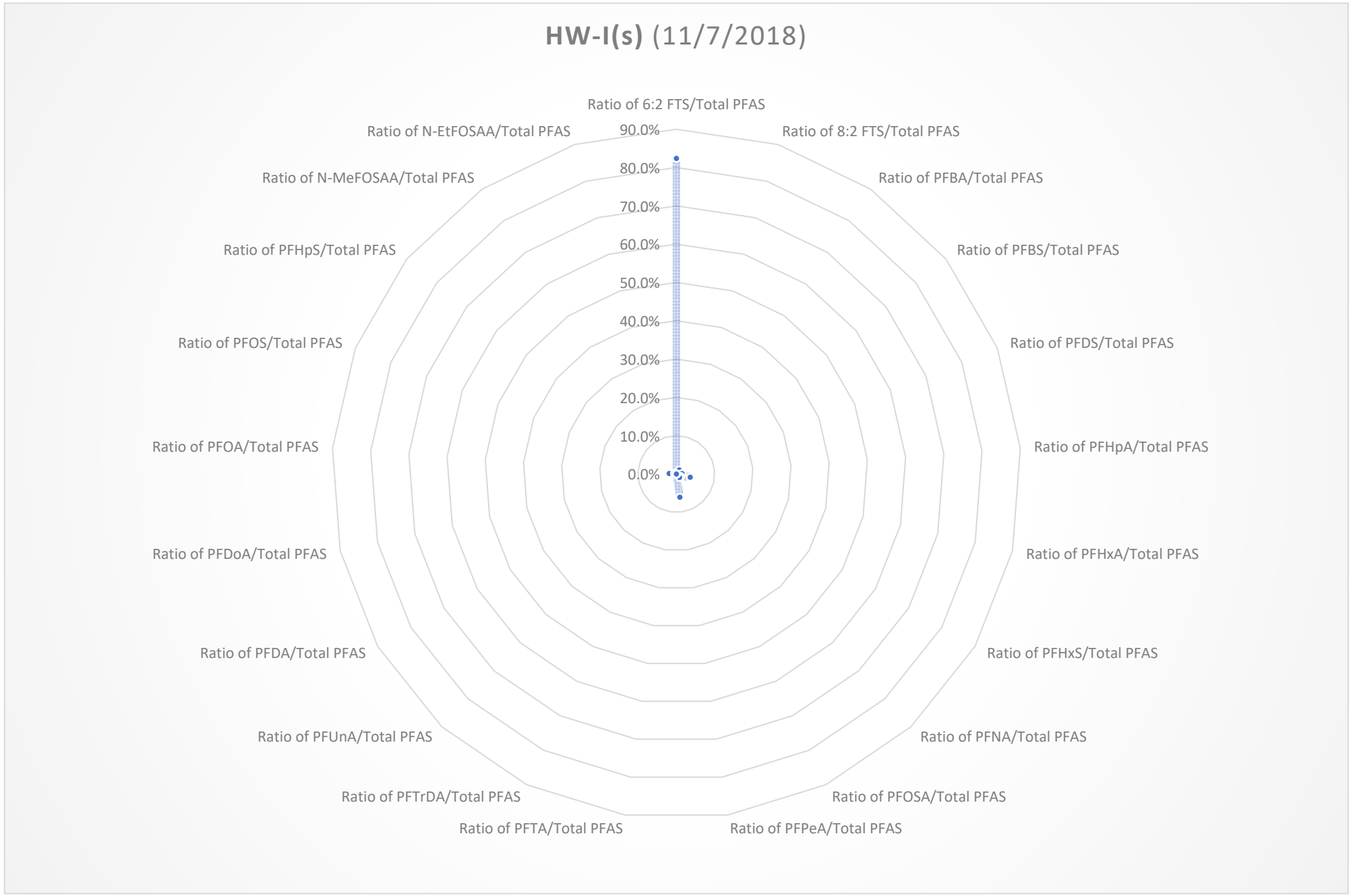

PC-8 (3/8/2016)
Ratio of 6:2 FTS/Total PFAS
Ratio of 8:2 FTS/Total PFAS
Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
Ratio of PFDS/Total PFAS
Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
50.0%
45.0%
40.0%
35.0%
30.0%
25.0%
20.0%
15.0%
10.0%
5.0%
0.0%

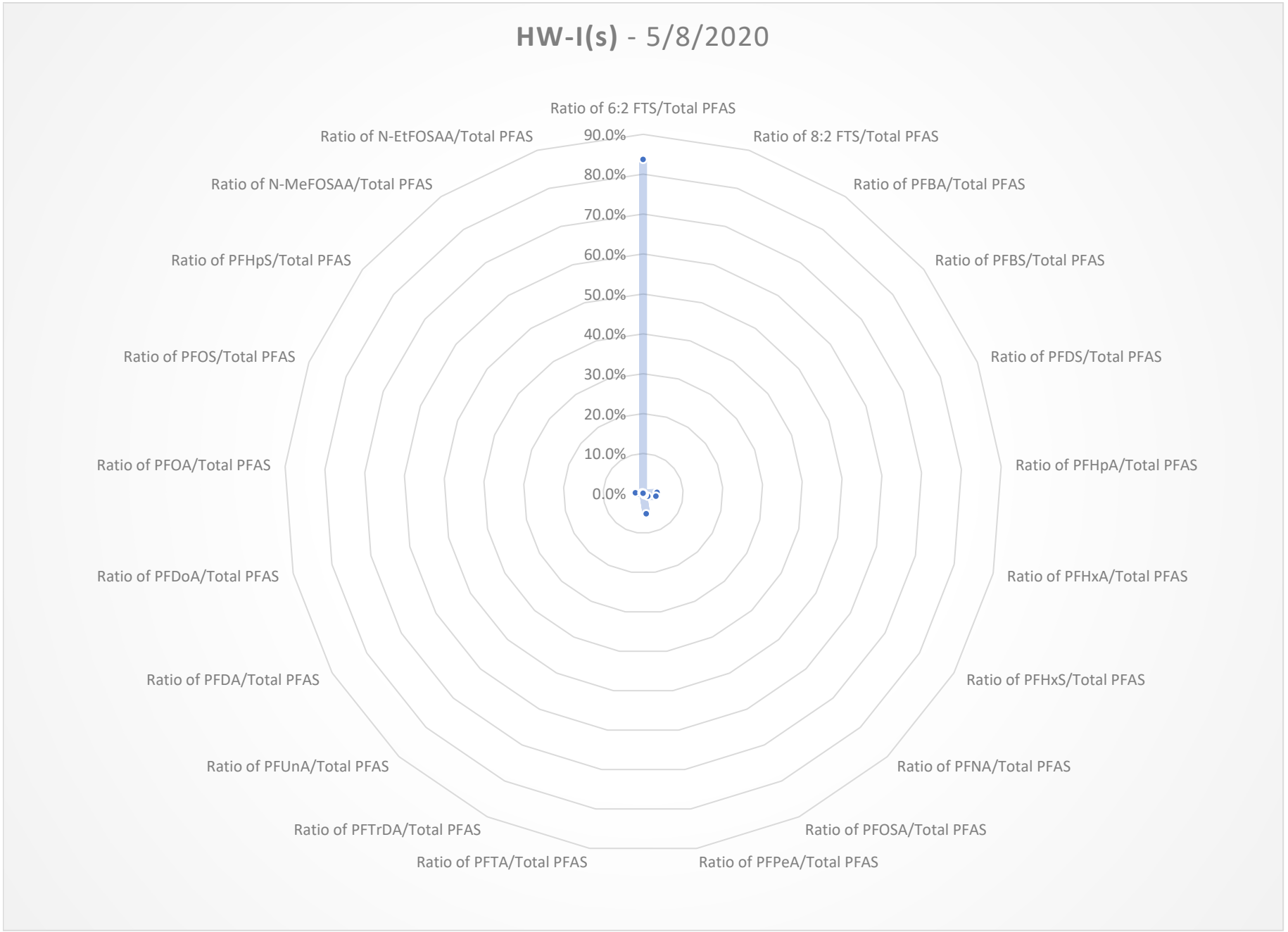

PRW-4 (9/30/2015)
Ratio of 6:2 FTS/Total PFAS
Ratio of 8:2 FTS/Total PFAS
Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
Ratio of PFDS/Total PFAS
Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%

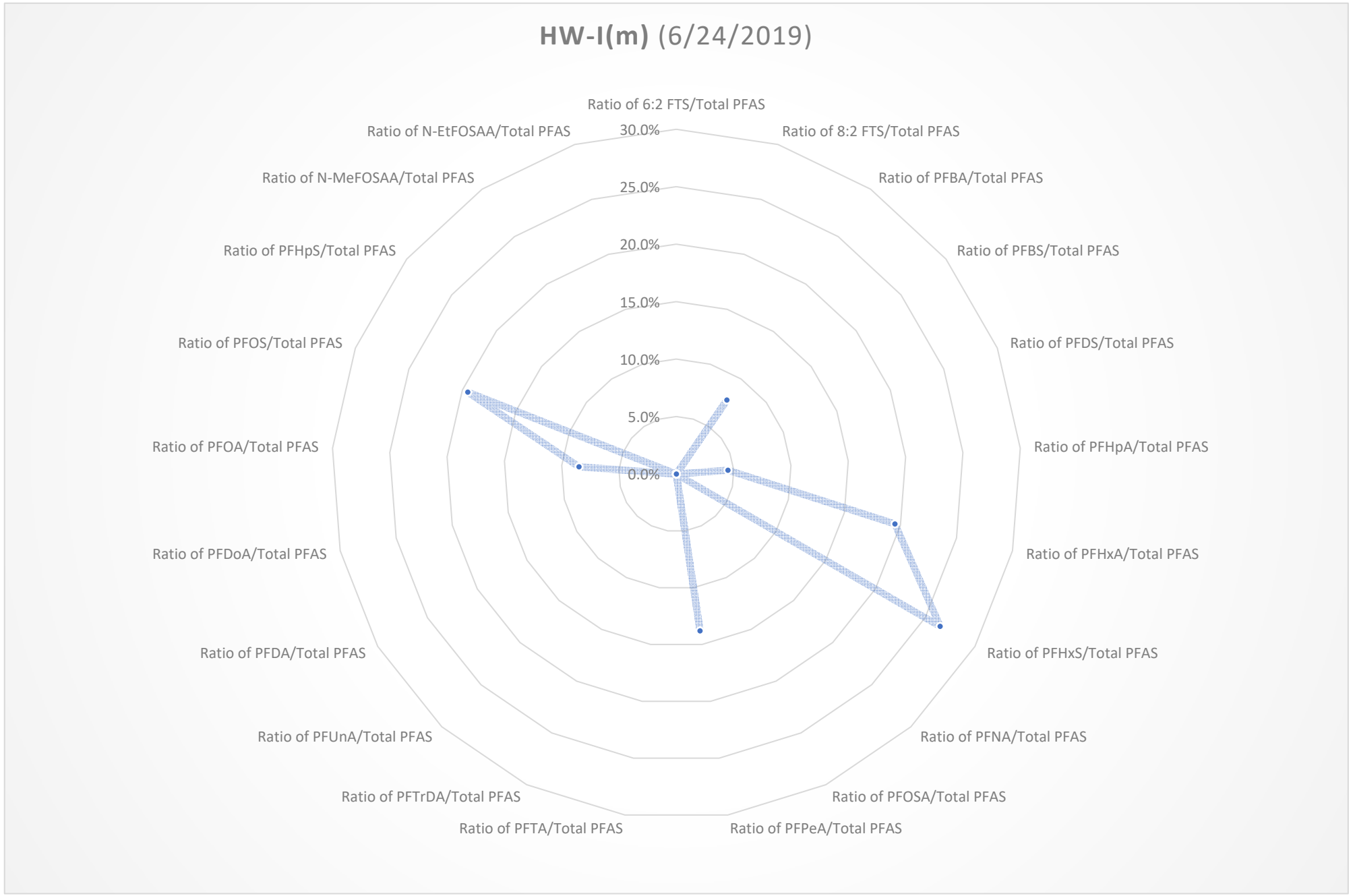

PC-18 (6/17/2015)
Ratio of 6:2 FTS/Total PFAS
Ratio of 8:2 FTS/Total PFAS
Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
Ratio of PFDS/Total PFAS
Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
35.0%
30.0%
25.0%
20.0%
15.0%
10.0%
5.0%
0.0%

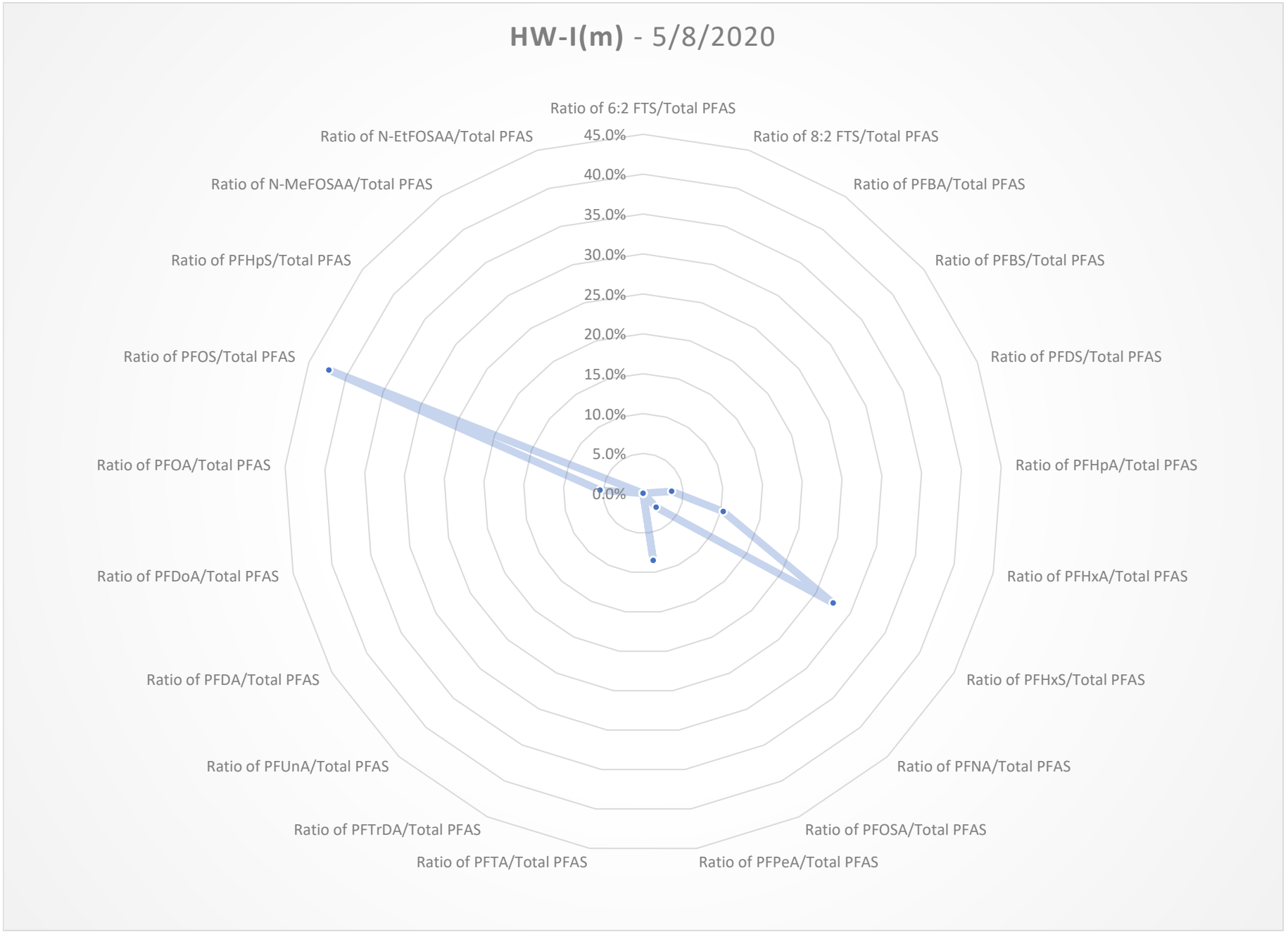

PC-9 (3/3/2016)
Ratio of 6:2 FTS/Total PFAS
Ratio of 8:2 FTS/Total PFAS
Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
Ratio of PFDS/Total PFAS
Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
35.0%
30.0%
25.0%
20.0%
15.0%
10.0%
5.0%
0.0%


PC-24 (1/7/2015)
Ratio of 6:2 FTS/Total PFAS
Ratio of 8:2 FTS/Total PFAS
Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
Ratio of PFDS/Total PFAS
Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
80.0%
70.0%
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%


HW-I(s) (11/7/2018)
Ratio of 6:2 FTS/Total PFAS
Ratio of 8:2 FTS/Total PFAS
Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
Ratio of PFDS/Total PFAS
Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
90.0%
80.0%
70.0%
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%


HW-I(s) - 5/8/2020
Ratio of 6:2 FTS/Total PFAS
Ratio of 8:2 FTS/Total PFAS
Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
Ratio of PFDS/Total PFAS
Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
90.0%
80.0%
70.0%
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%


HW-I(m) (6/24/2019)
Ratio of 6:2 FTS/Total PFAS
Ratio of 8:2 FTS/Total PFAS
Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
Ratio of PFDS/Total PFAS
Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
30.0%
25.0%
20.0%
15.0%
10.0%
5.0%
0.0%


HW-I(m) - 5/8/2020
Ratio of 6:2 FTS/Total PFAS
Ratio of 8:2 FTS/Total PFAS
Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
Ratio of PFDS/Total PFAS
Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
45.0%
40.0%
35.0%
30.0%
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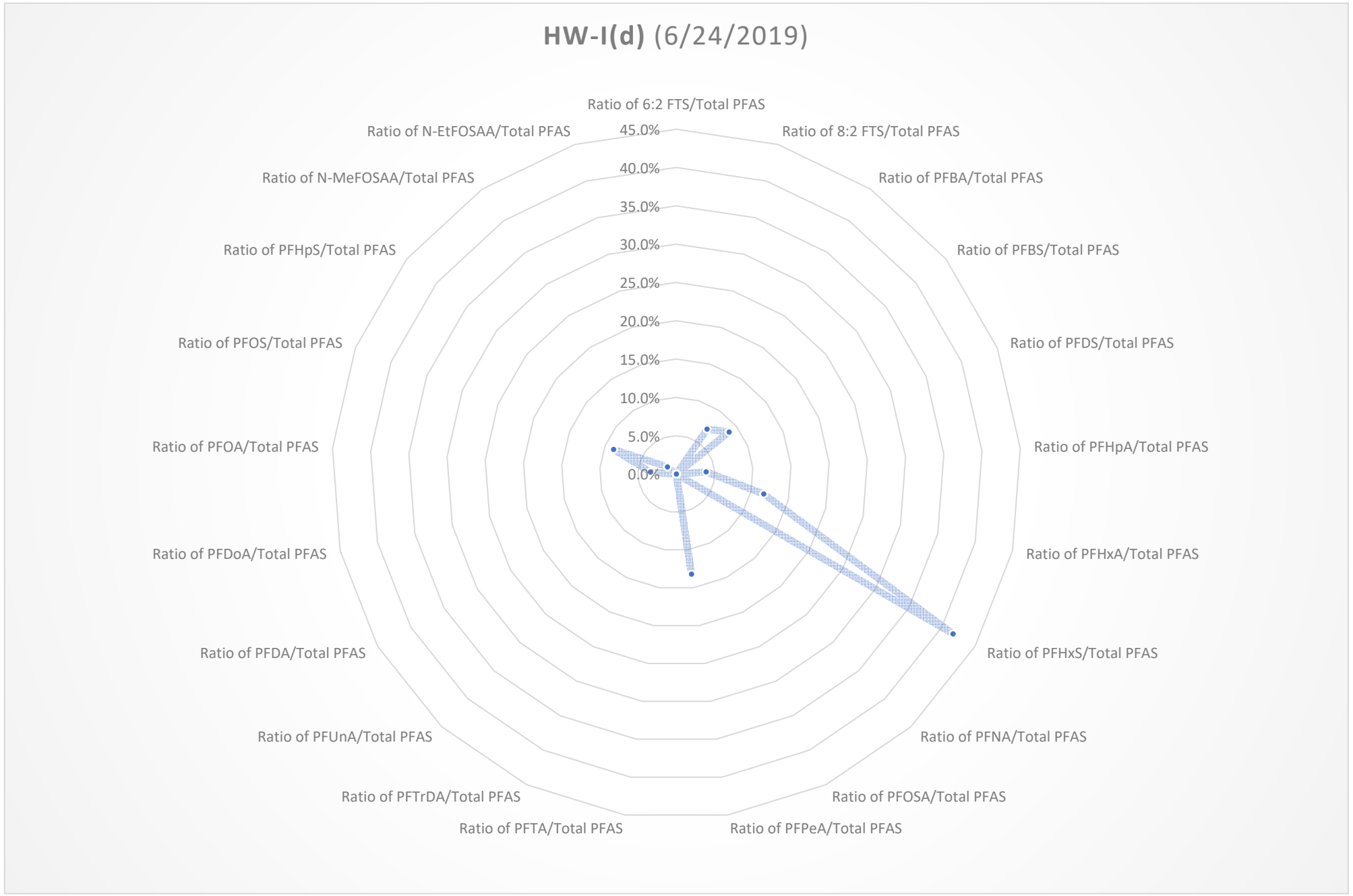
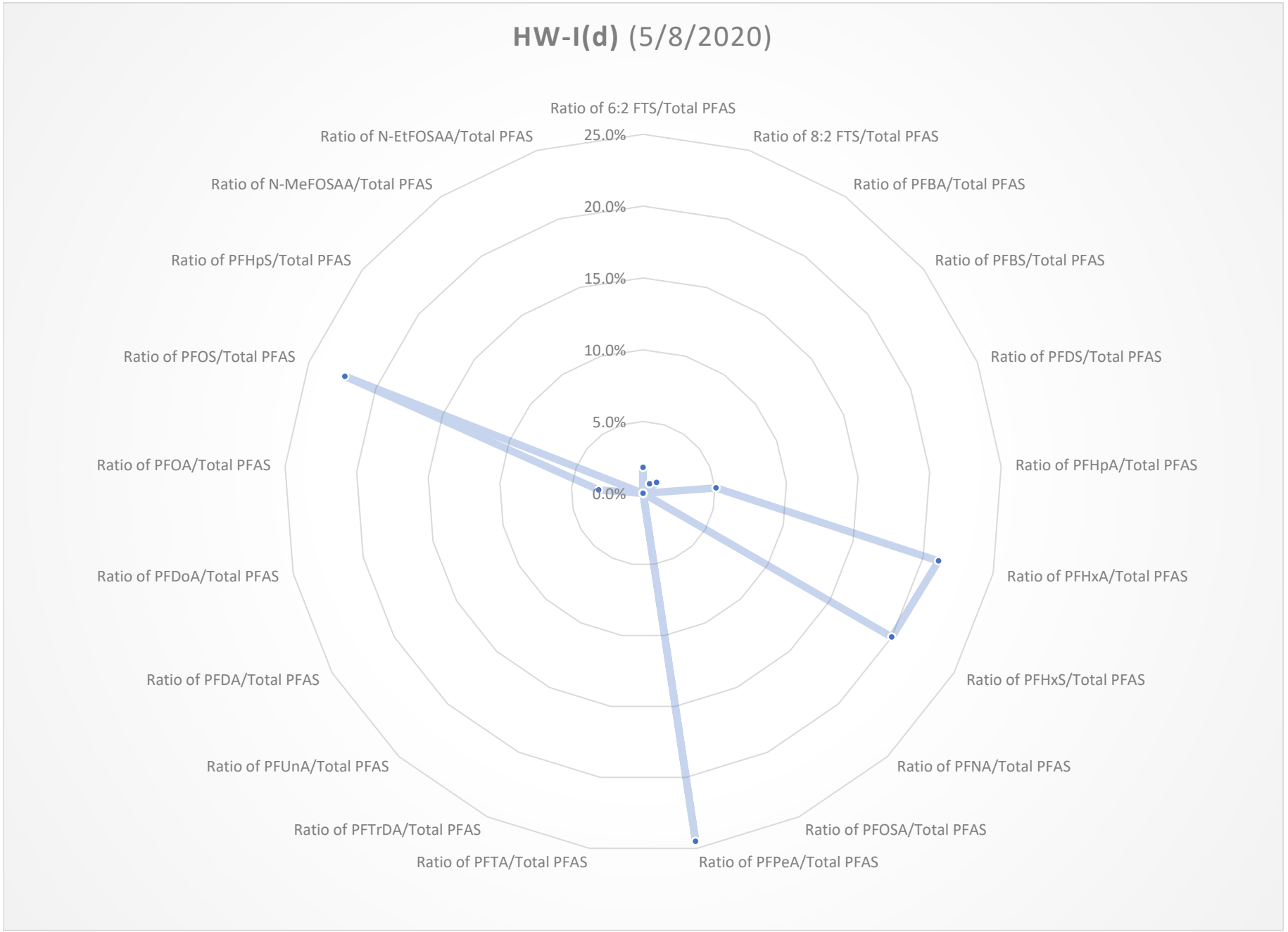
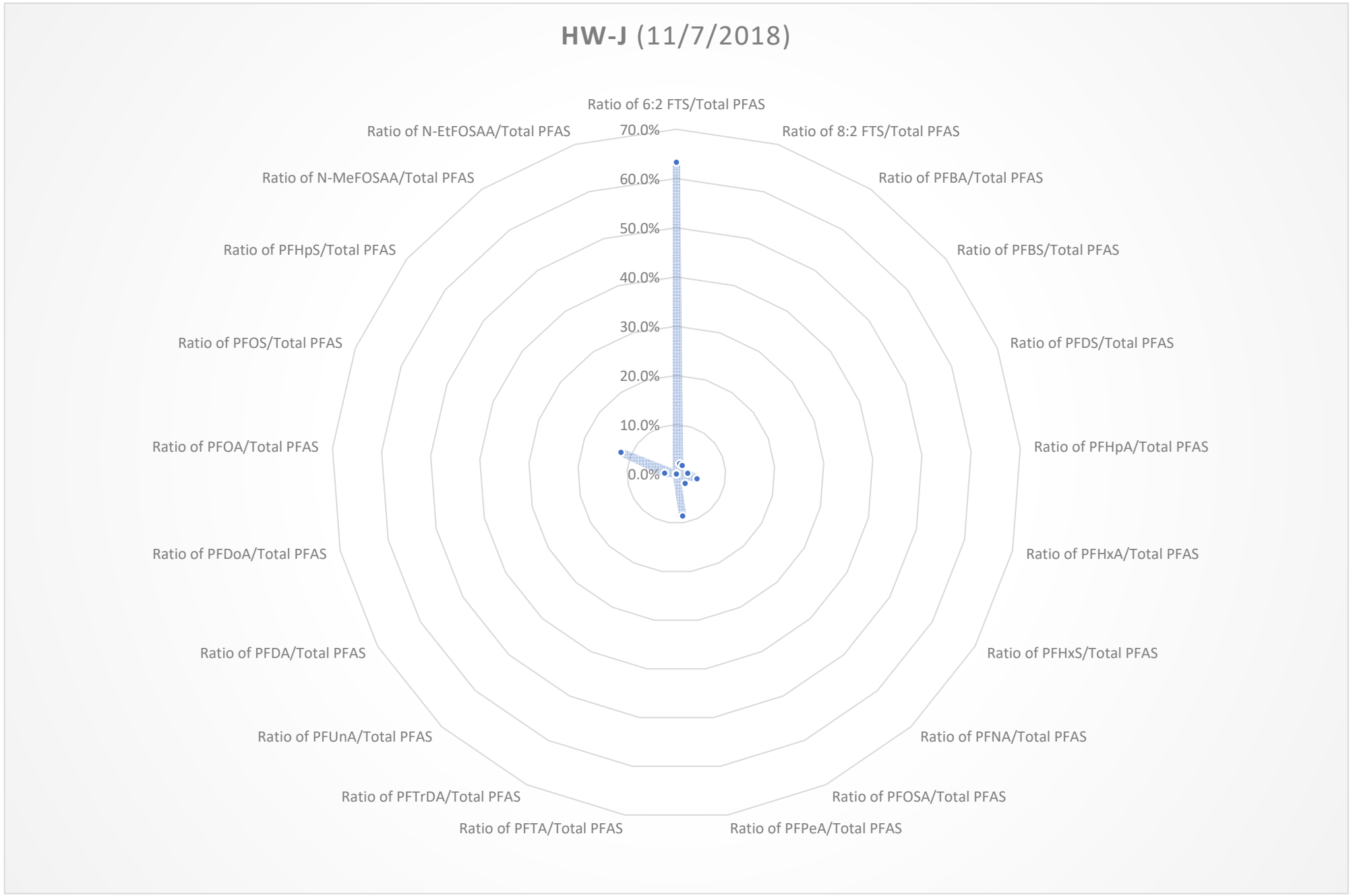
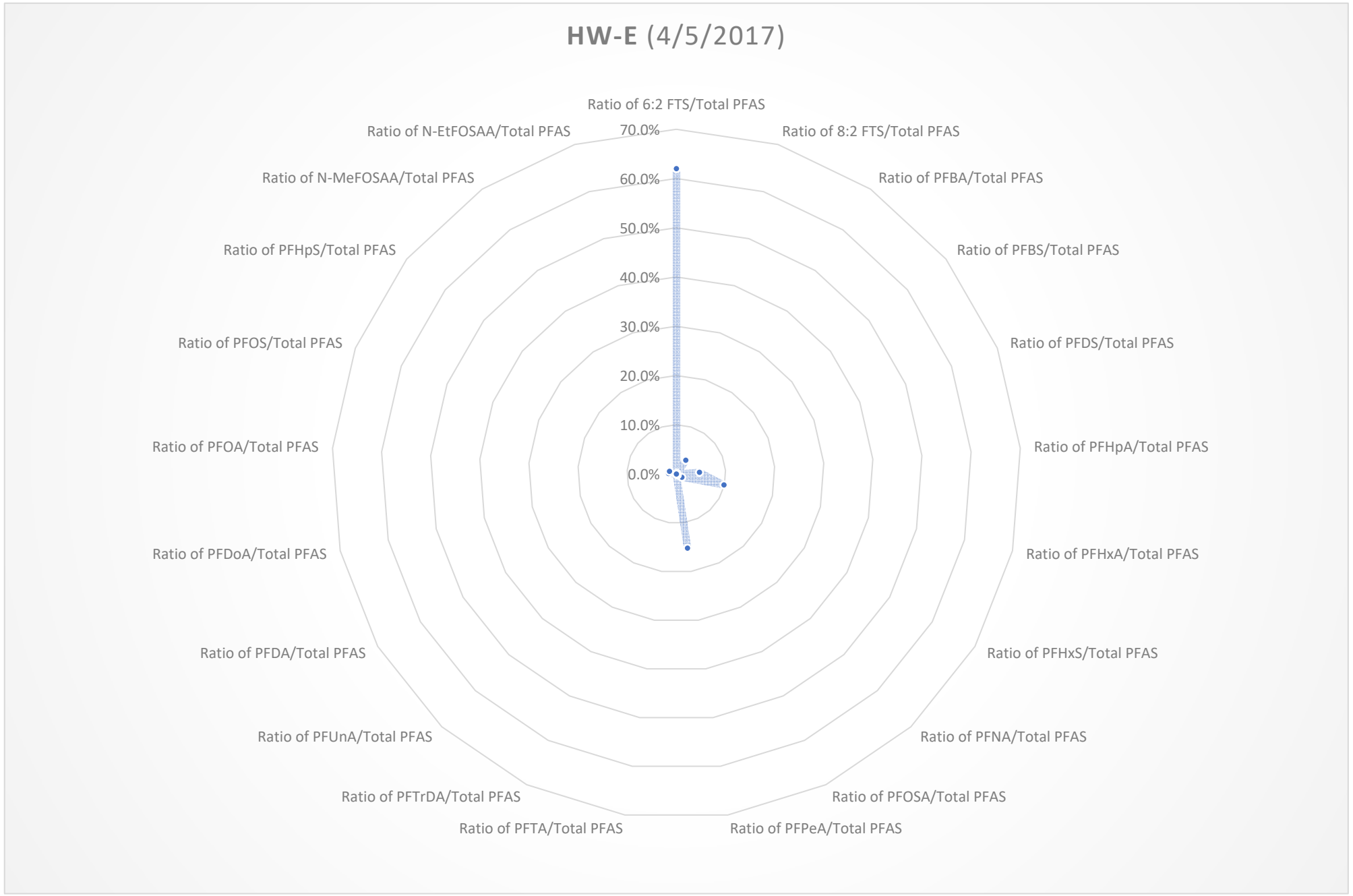
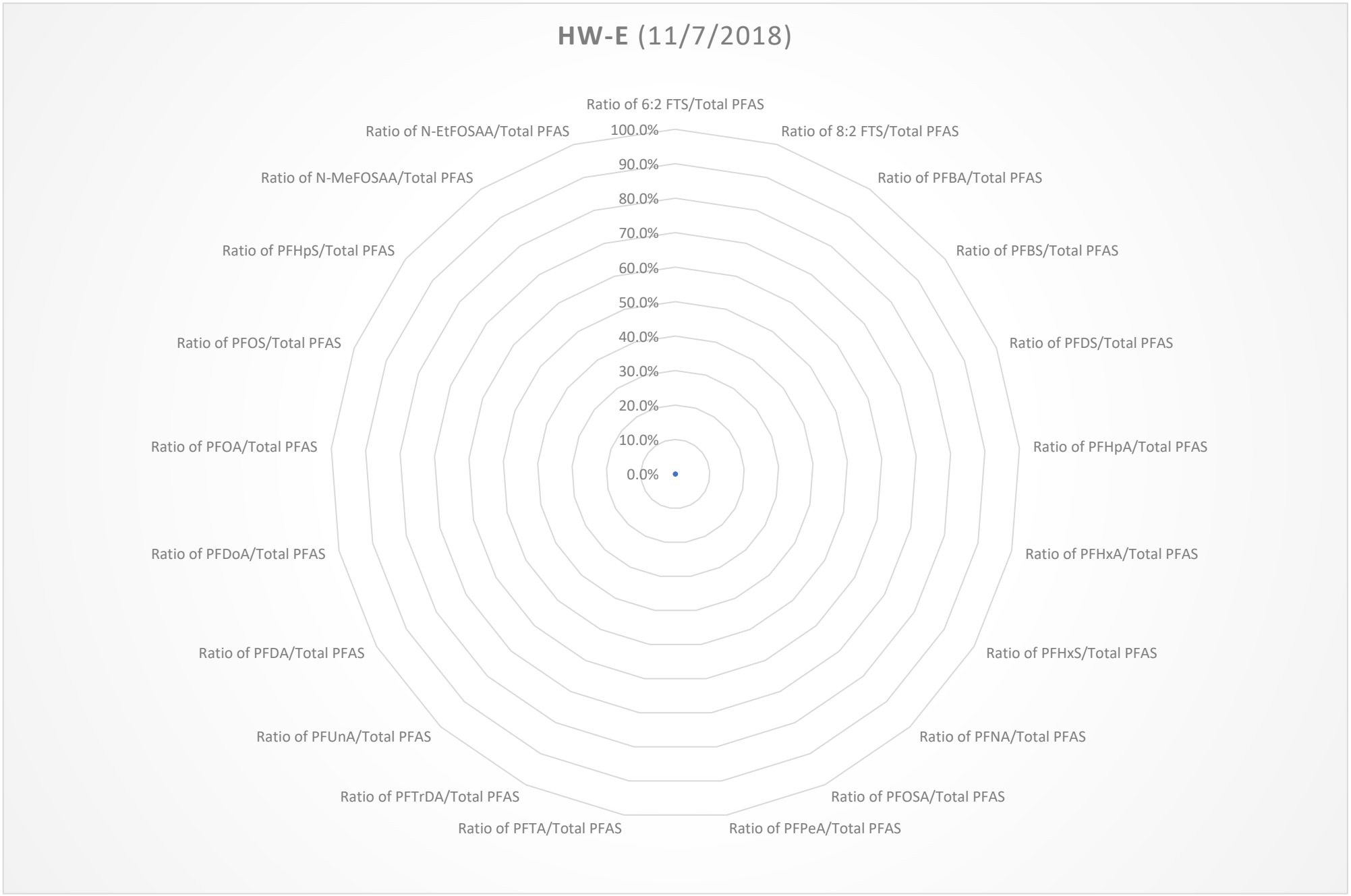
20.0%
15.0%
10.0%
5.0%
0.0%

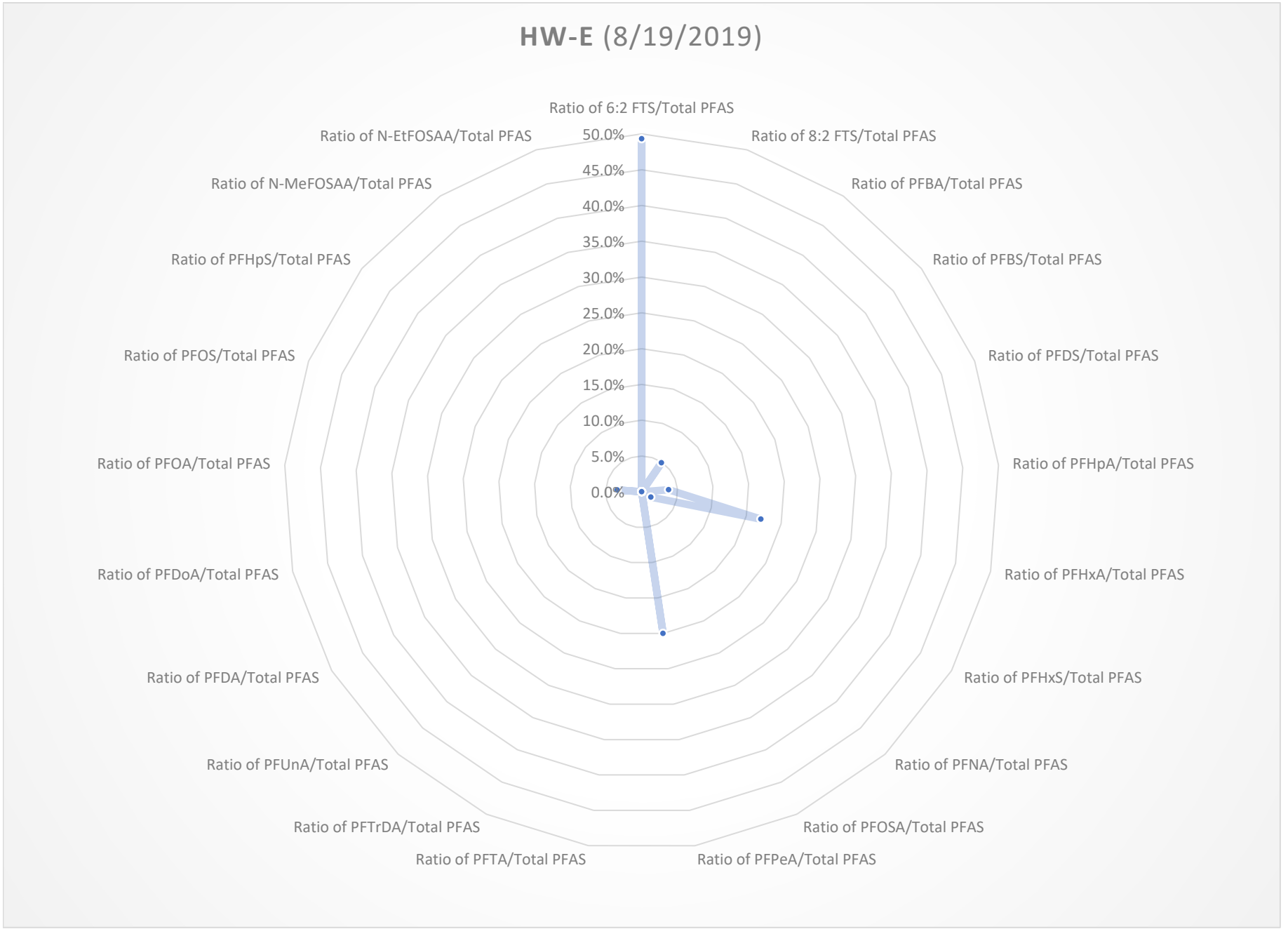

HW-I(d) (6/24/2019)
Ratio of 6:2 FTS/Total PFAS
Ratio of 8:2 FTS/Total PFAS
Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
Ratio of PFDS/Total PFAS
Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
45.0%
40.0%
35.0%
30.0%
25.0%
20.0%
15.0%
10.0%
5.0%
0.0%

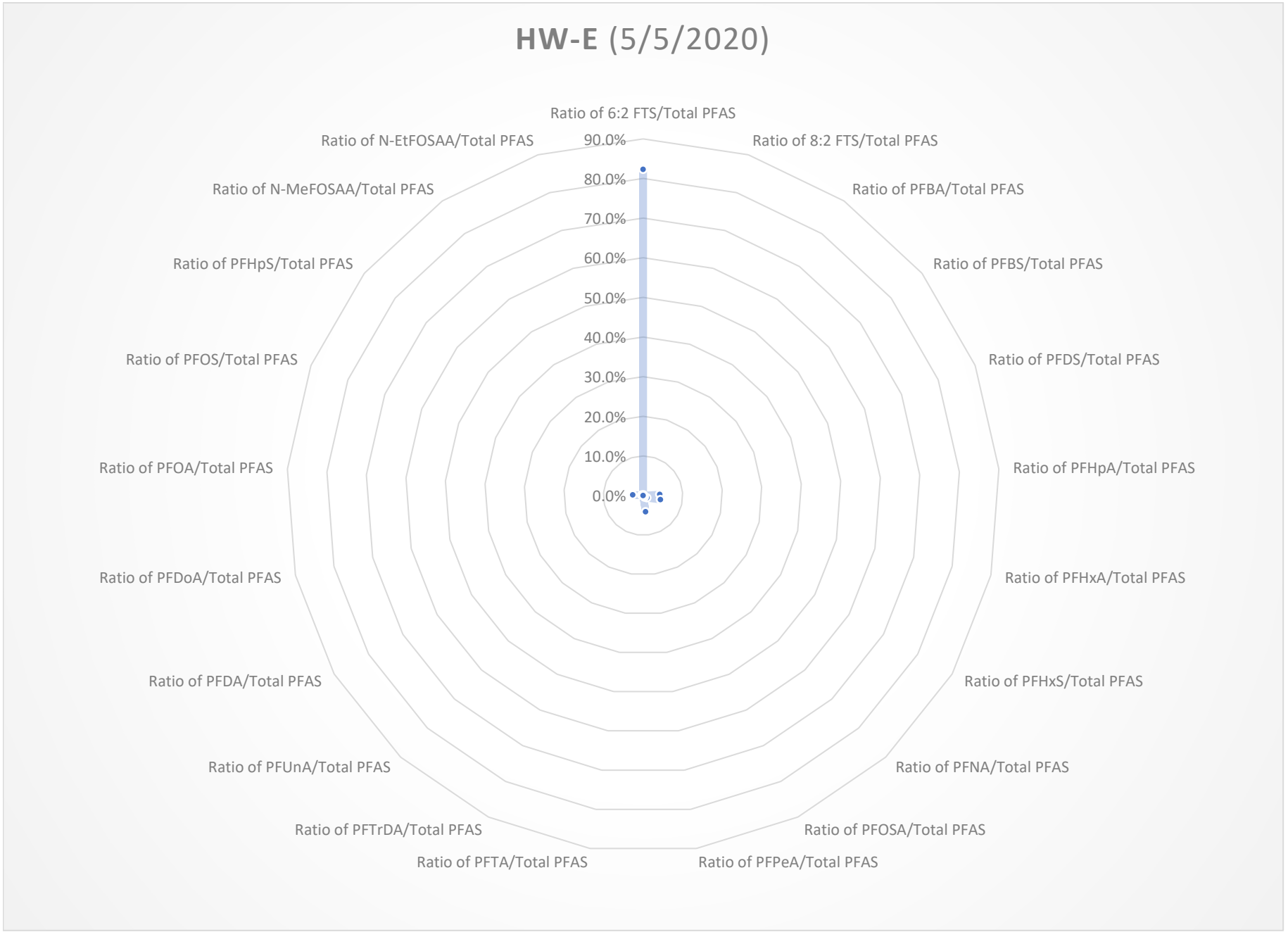

HW-I(d) (5/8/2020)
Ratio of 6:2 FTS/Total PFAS
Ratio of 8:2 FTS/Total PFAS
Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
Ratio of PFDS/Total PFAS
Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
25.0%
20.0%
15.0%
10.0%
5.0%
0.0%

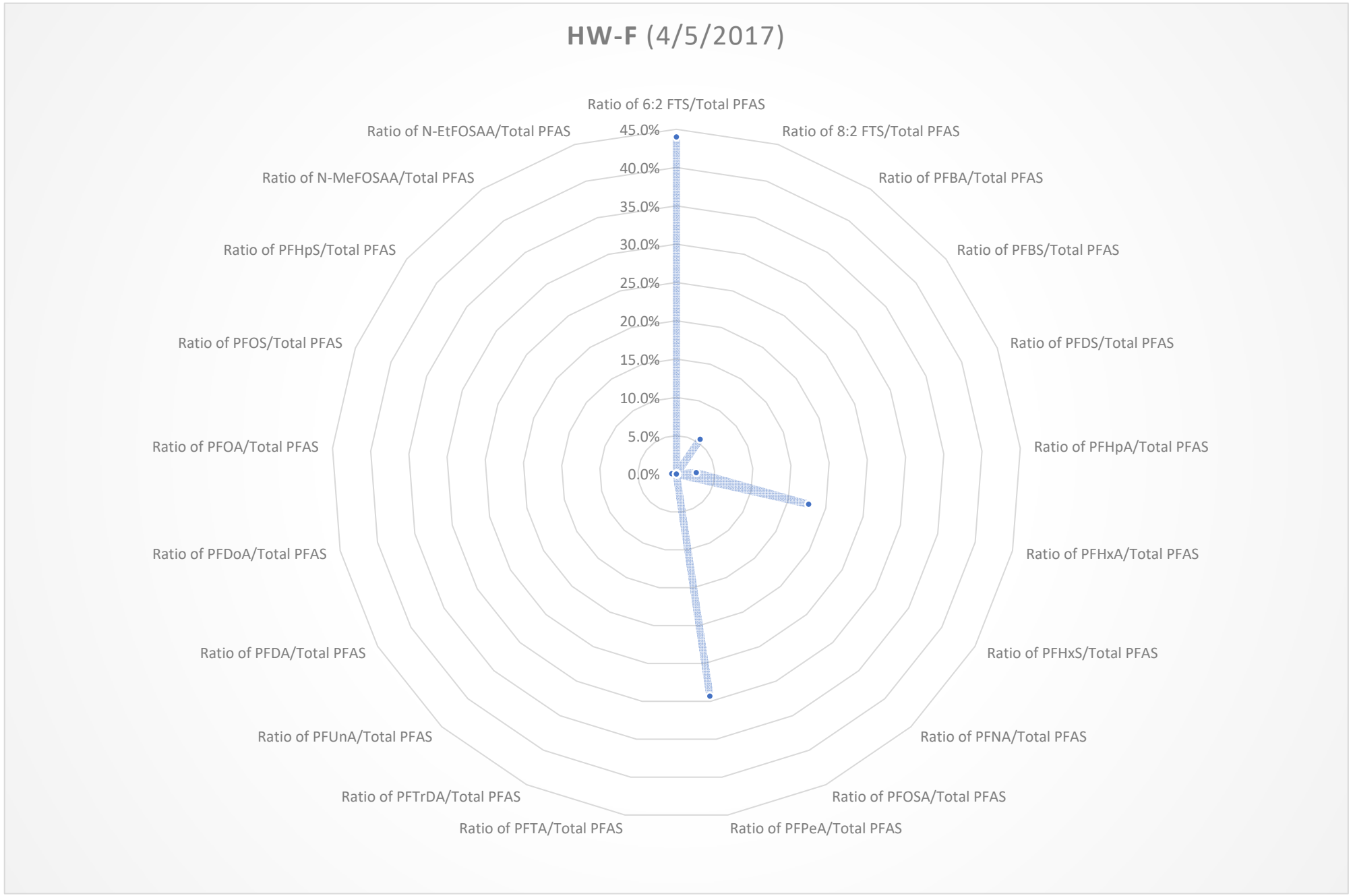

HW-J (11/7/2018)
Ratio of 6:2 FTS/Total PFAS
Ratio of 8:2 FTS/Total PFAS
Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
Ratio of PFDS/Total PFAS
Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
70.0%
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%

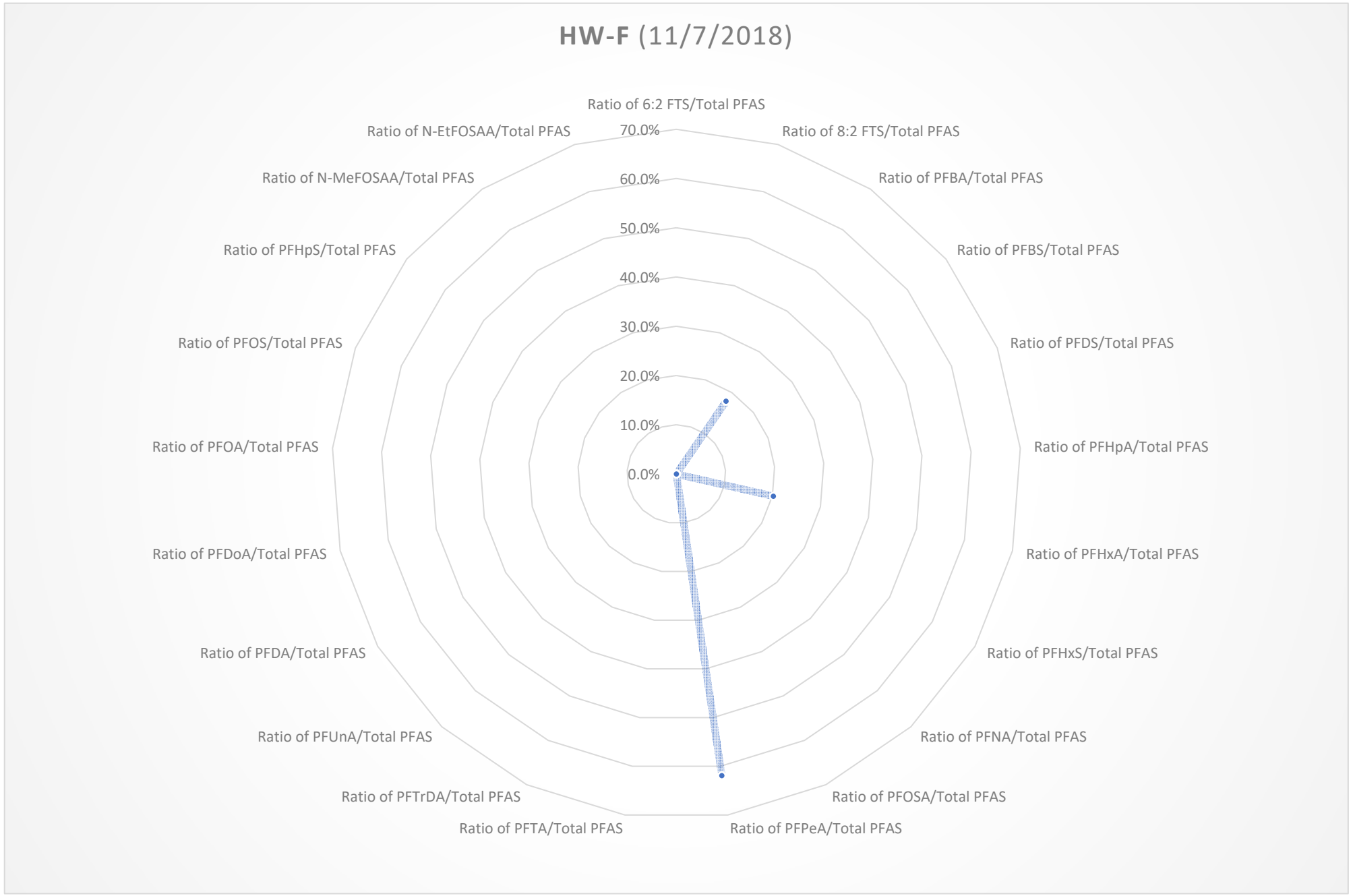

HW-E (4/5/2017)
Ratio of 6:2 FTS/Total PFAS
Ratio of 8:2 FTS/Total PFAS
Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
Ratio of PFDS/Total PFAS
Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
70.0%
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%

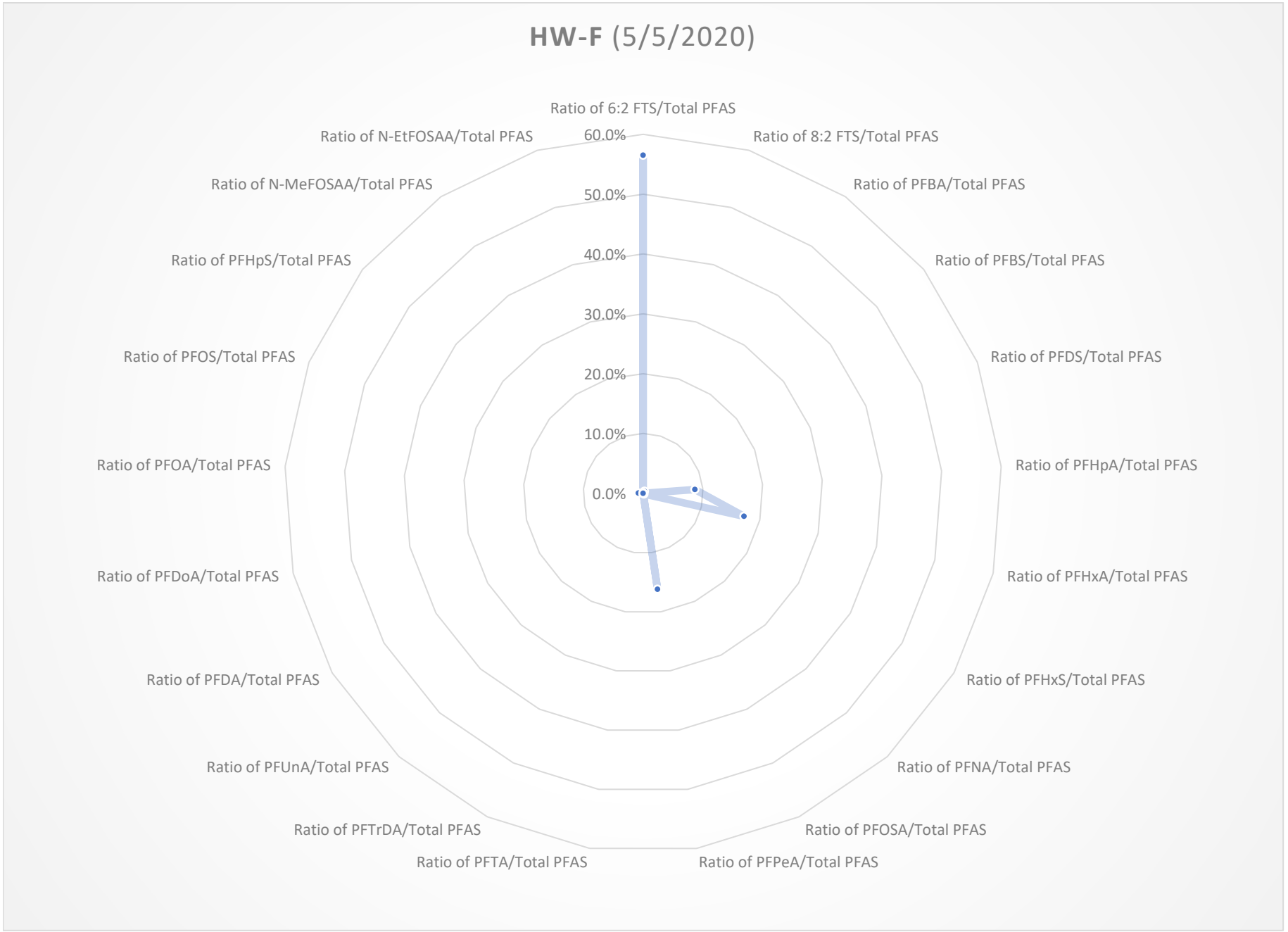

HW-E (11/7/2018)
Ratio of 6:2 FTS/Total PFAS
Ratio of 8:2 FTS/Total PFAS
Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
Ratio of PFDS/Total PFAS
Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
100.0%
90.0%
80.0%
70.0%
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%

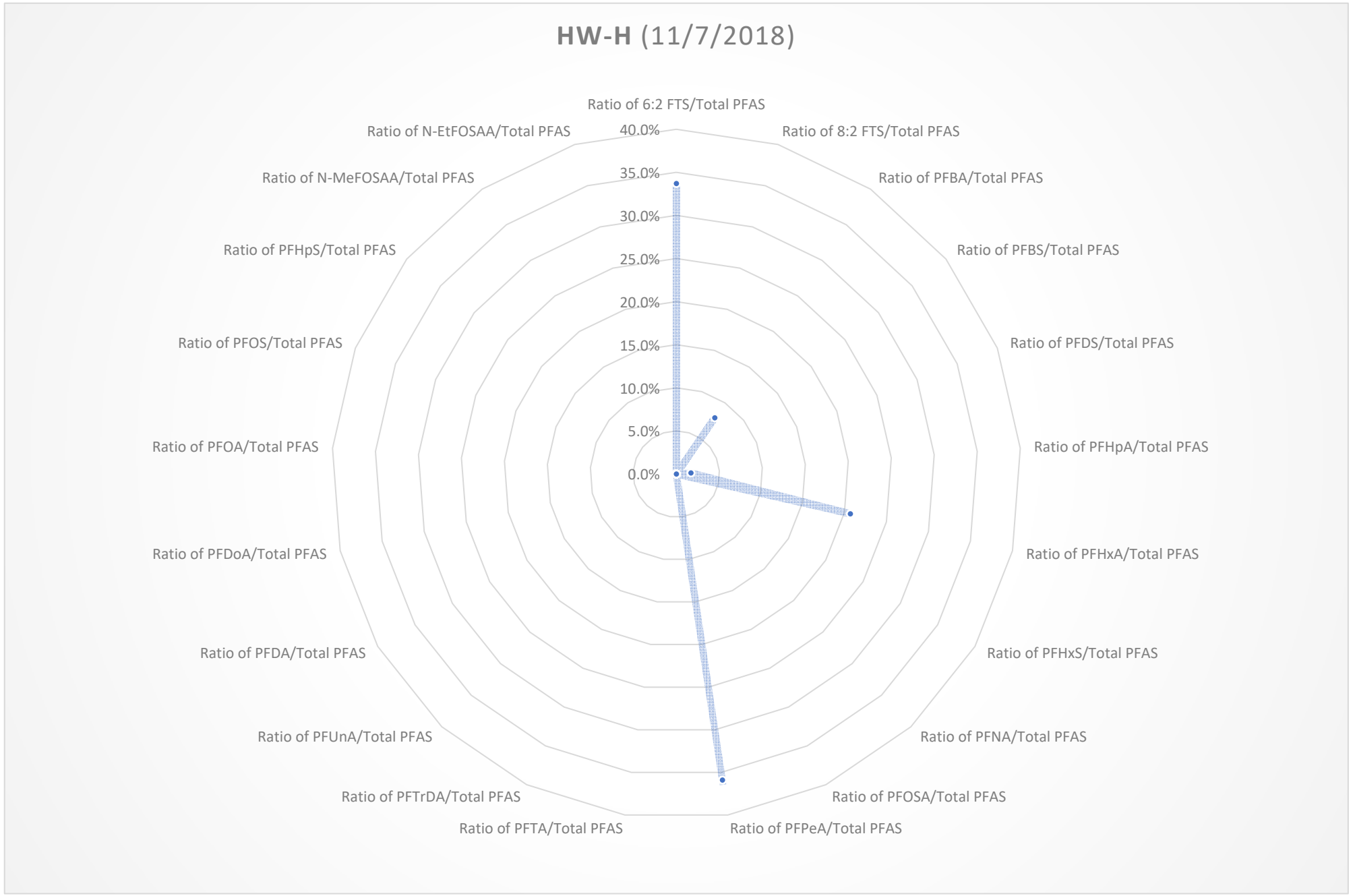

HW-E (8/19/2019)
Ratio of 6:2 FTS/Total PFAS
Ratio of 8:2 FTS/Total PFAS
Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
Ratio of PFDS/Total PFAS
Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
50.0%
45.0%
40.0%
35.0%
30.0%
25.0%
20.0%
15.0%
10.0%
5.0%
0.0%

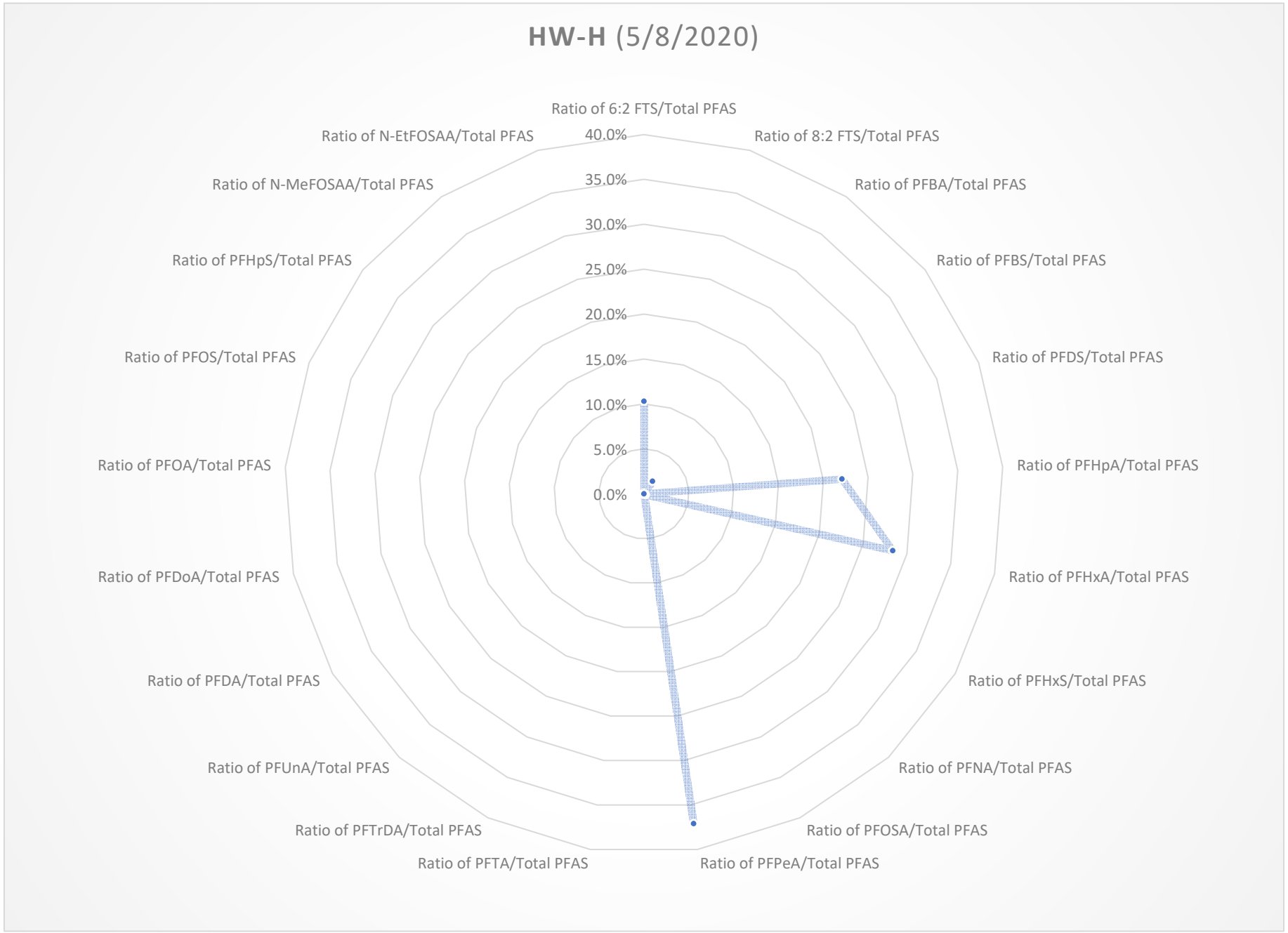

HW-E (5/5/2020)
Ratio of 6:2 FTS/Total PFAS
Ratio of 8:2 FTS/Total PFAS
Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
Ratio of PFDS/Total PFAS
Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
90.0%
80.0%
70.0%
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%


HW-F (4/5/2017)
Ratio of 6:2 FTS/Total PFAS
Ratio of 8:2 FTS/Total PFAS
Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
Ratio of PFDS/Total PFAS
Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
45.0%
40.0%
35.0%
30.0%
25.0%
20.0%
15.0%
10.0%
5.0%
0.0%

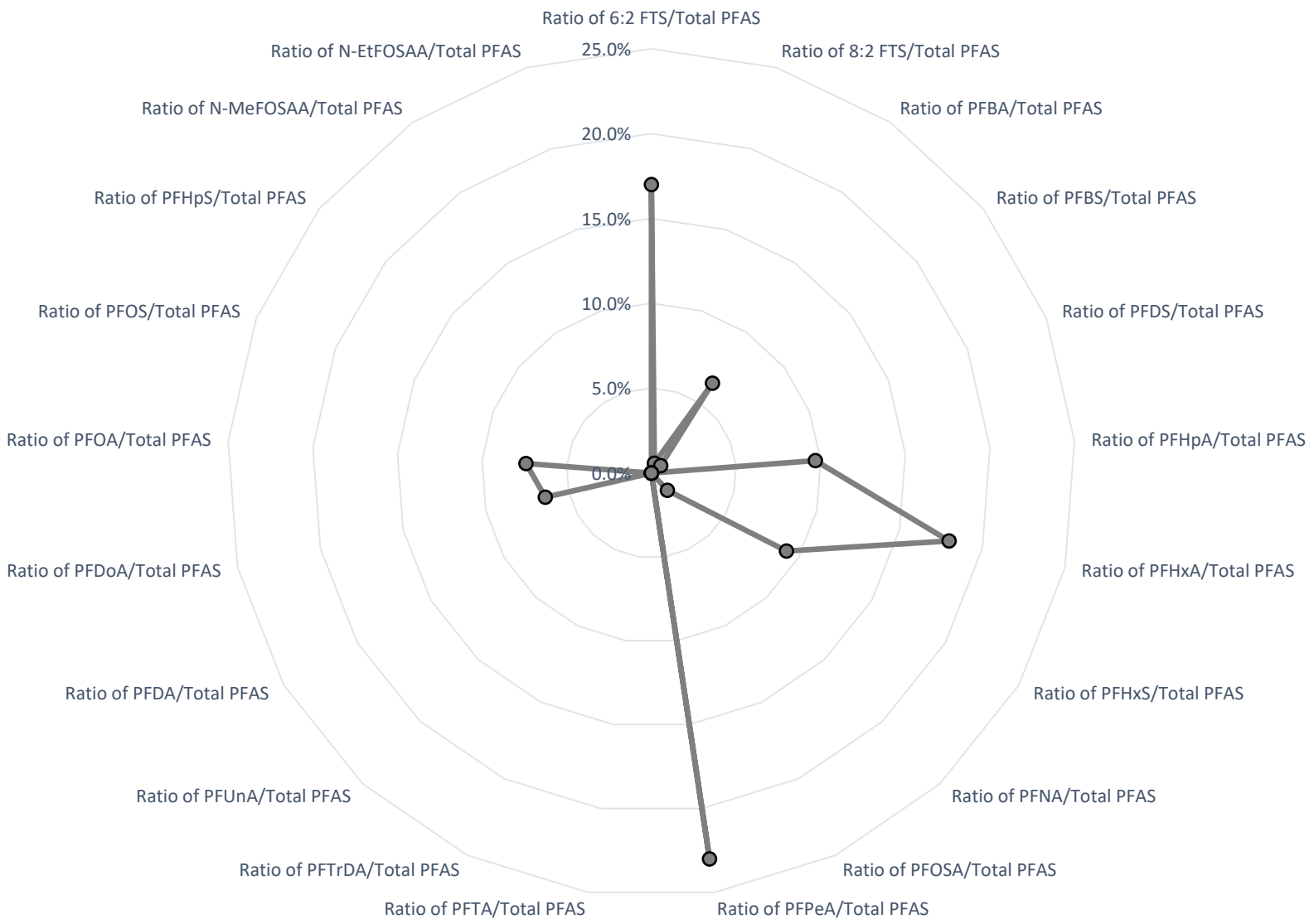

HW-F (11/7/2018)
Ratio of 6:2 FTS/Total PFAS
Ratio of 8:2 FTS/Total PFAS
Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
Ratio of PFDS/Total PFAS
Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
70.0%
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%

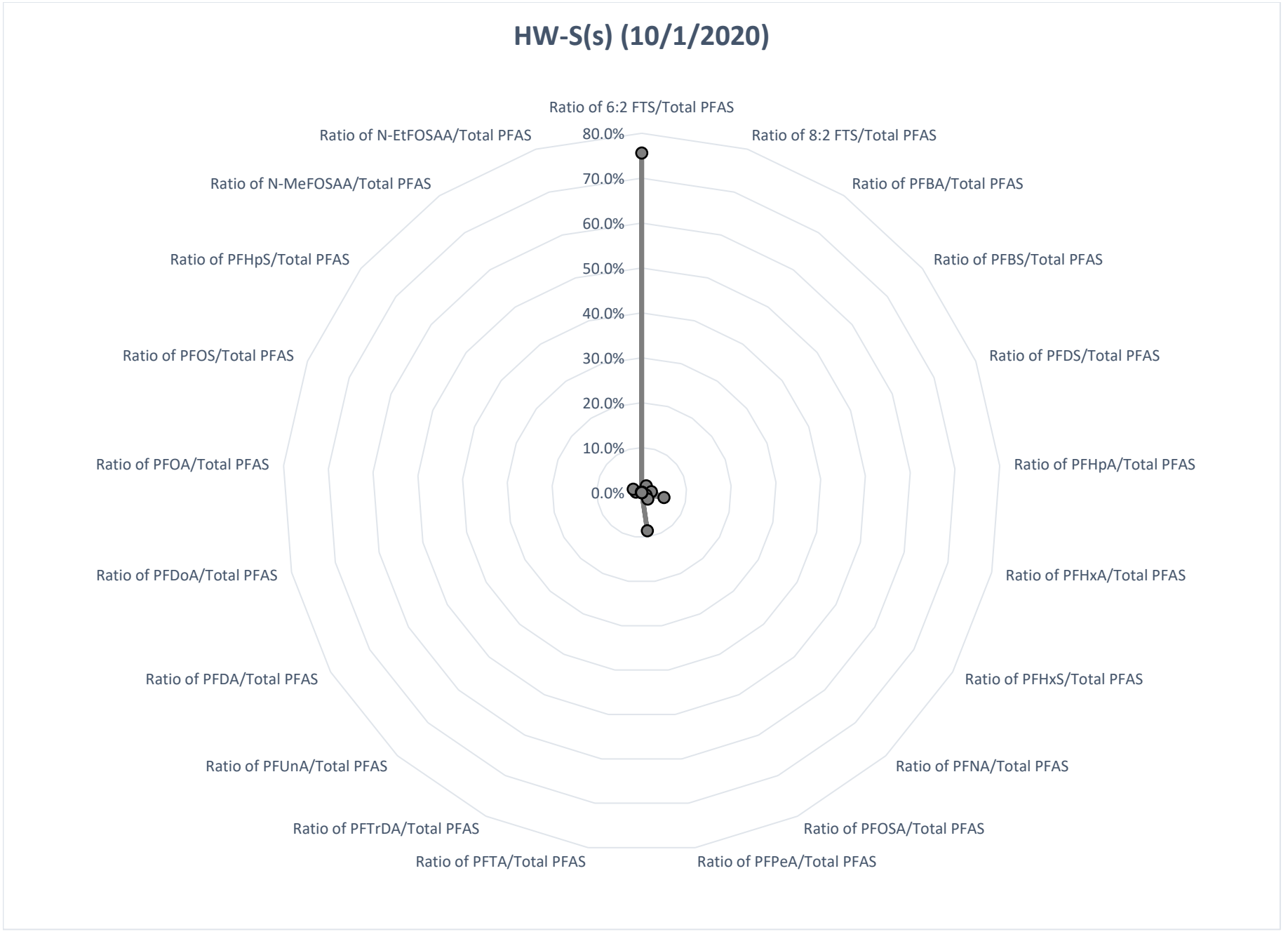

HW-F (5/5/2020)
Ratio of 6:2 FTS/Total PFAS
Ratio of 8:2 FTS/Total PFAS
Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
Ratio of PFDS/Total PFAS
Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%


HW-H (11/7/2018)
Ratio of 6:2 FTS/Total PFAS
Ratio of 8:2 FTS/Total PFAS
Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
Ratio of PFDS/Total PFAS
Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
40.0%
35.0%
30.0%
25.0%
20.0%
15.0%
10.0%
5.0%
0.0%

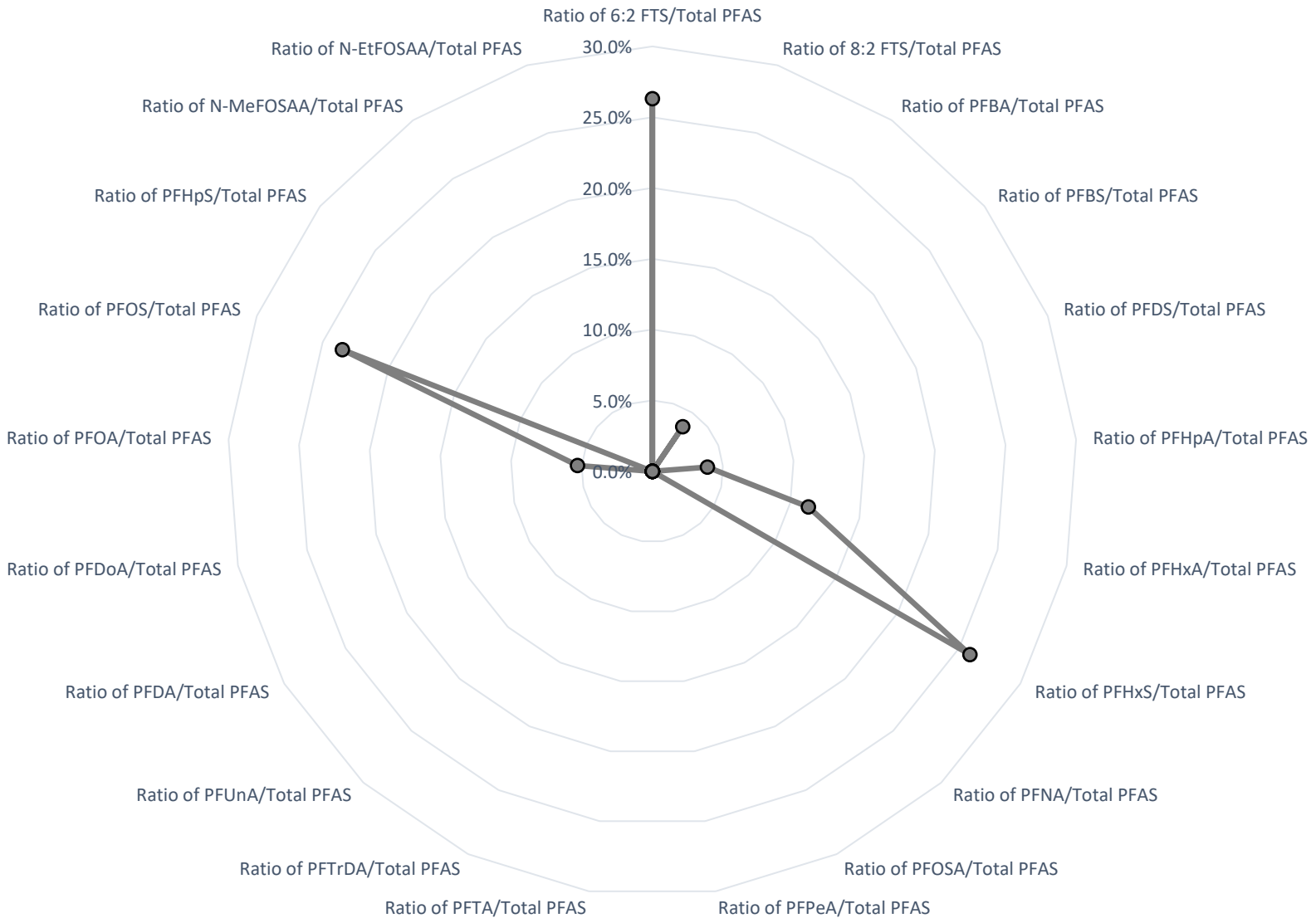

HW-H (5/8/2020)
Ratio of 6:2 FTS/Total PFAS
Ratio of 8:2 FTS/Total PFAS
Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
Ratio of PFDS/Total PFAS
Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
40.0%
35.0%
30.0%
25.0%
20.0%
15.0%
10.0%
5.0%
0.0%

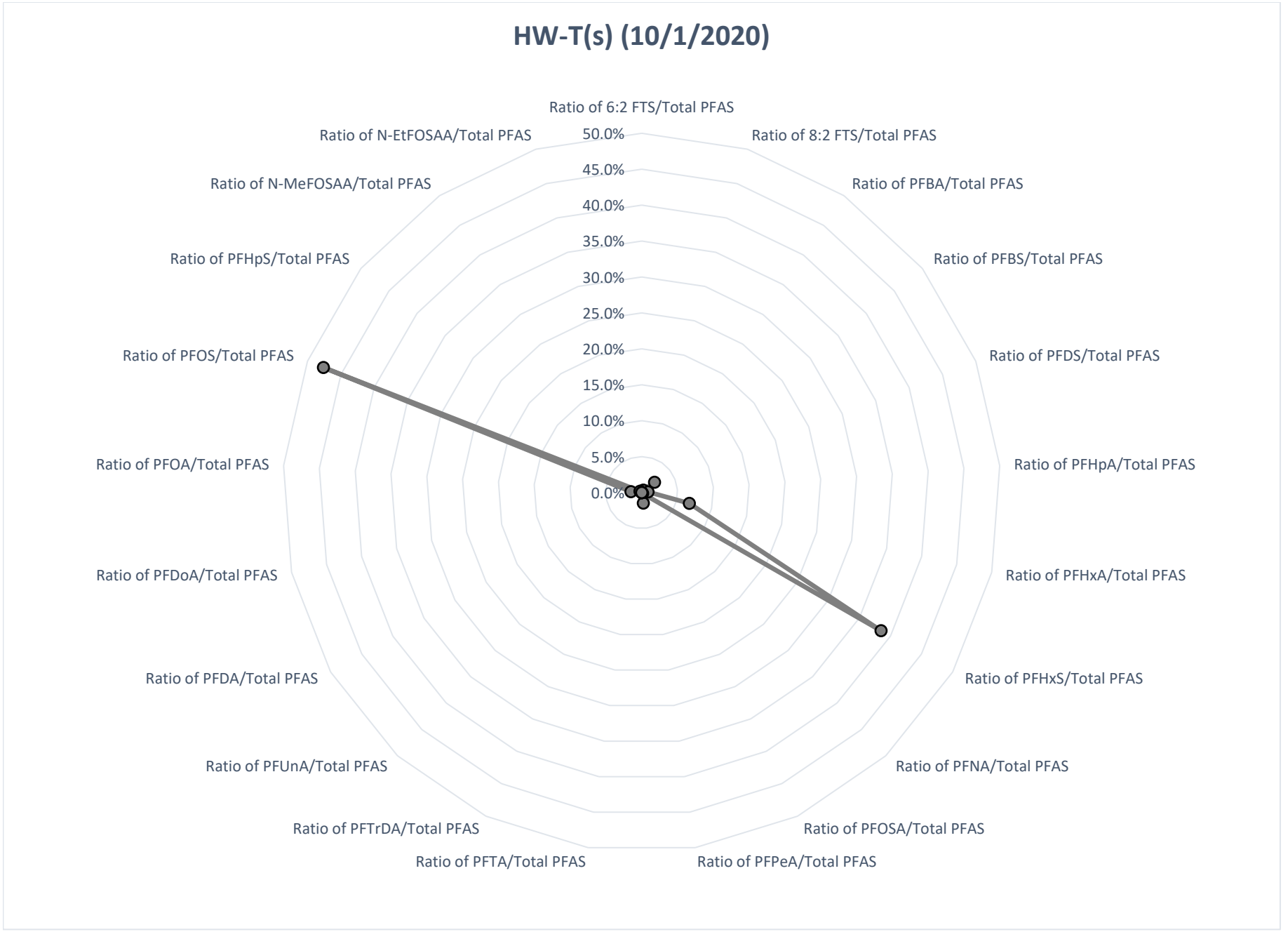
HW-R (10/1/2020)

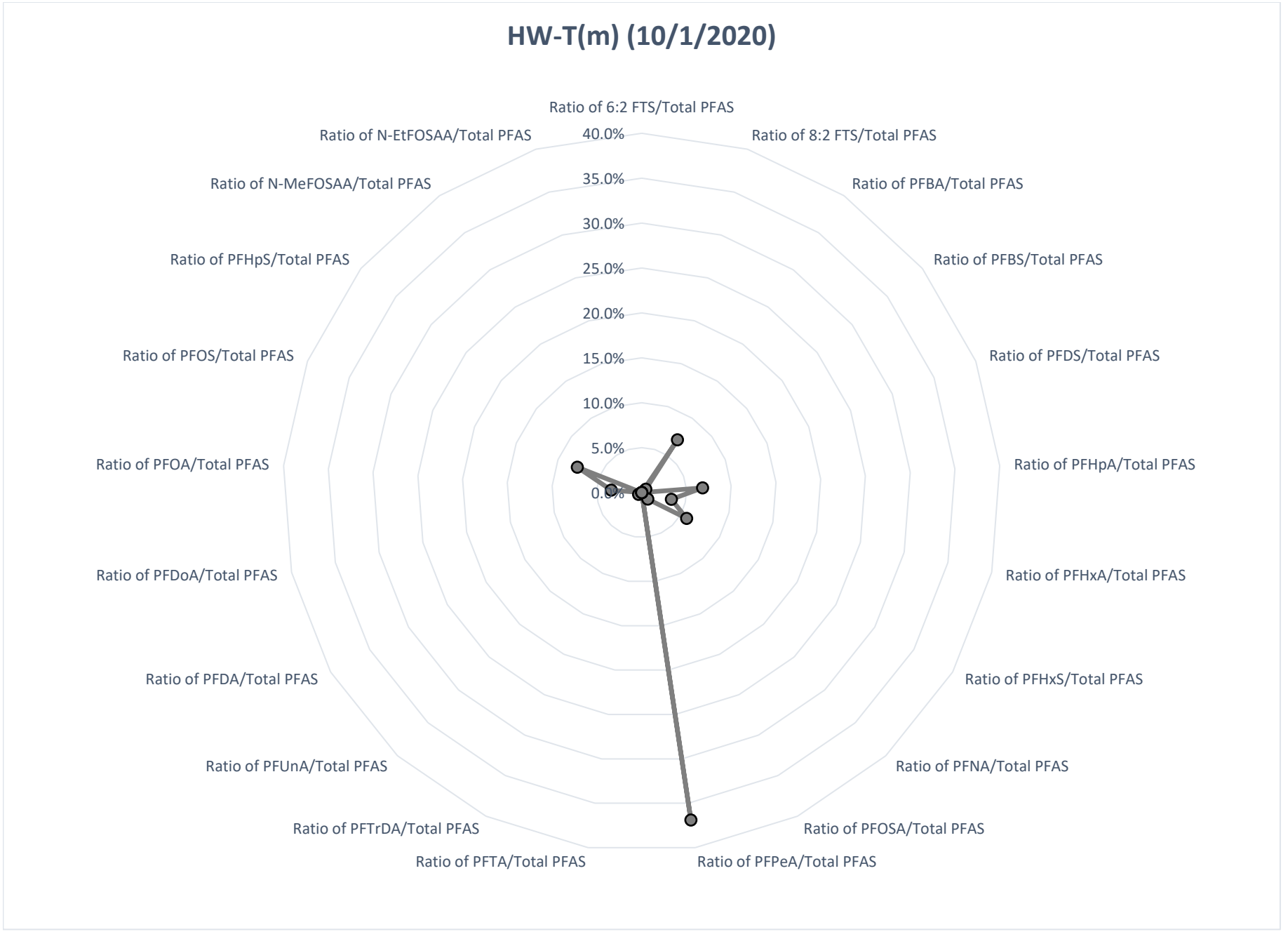

Ratio of 6:2 FTS/Total PFAS
Ratio of 8:2 FTS/Total PFAS
Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
Ratio of PFDS/Total PFAS
Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
25.0%
20.0%
15.0%
10.0%
5.0%
0.0%

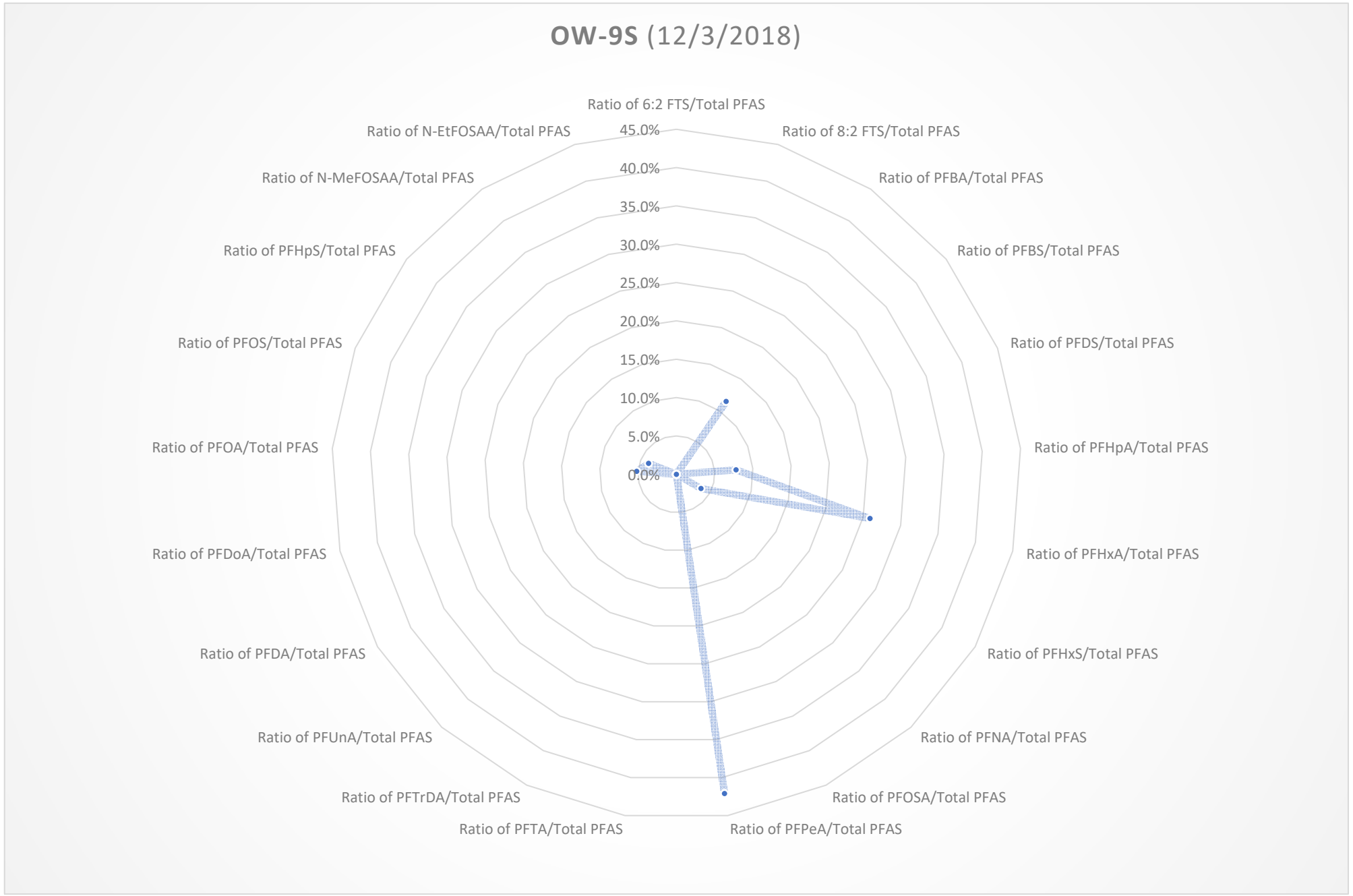

HW-S(s) (10/1/2020)
Ratio of 6:2 FTS/Total PFAS
Ratio of 8:2 FTS/Total PFAS
Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
Ratio of PFDS/Total PFAS
Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
80.0%
70.0%
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%

HW-S(m) (10/1/2020)




HW-T(s) (10/1/2020)
Ratio of 6:2 FTS/Total PFAS
Ratio of 8:2 FTS/Total PFAS
Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
Ratio of PFDS/Total PFAS
Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
50.0%
45.0%
40.0%
35.0%
30.0%
25.0%
20.0%
15.0%
10.0%
5.0%
0.0%


HW-T(m) (10/1/2020)
Ratio of 6:2 FTS/Total PFAS
Ratio of 8:2 FTS/Total PFAS
Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
Ratio of PFDS/Total PFAS
Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
40.0%
35.0%
30.0%
25.0%
20.0%
15.0%
10.0%
5.0%
0.0%


OW-9S (12/3/2018)
Ratio of 6:2 FTS/Total PFAS
Ratio of 8:2 FTS/Total PFAS
Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
Ratio of PFDS/Total PFAS
Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
45.0%
40.0%
35.0%
30.0%
25.0%
20.0%
15.0%
10.0%
5.0%
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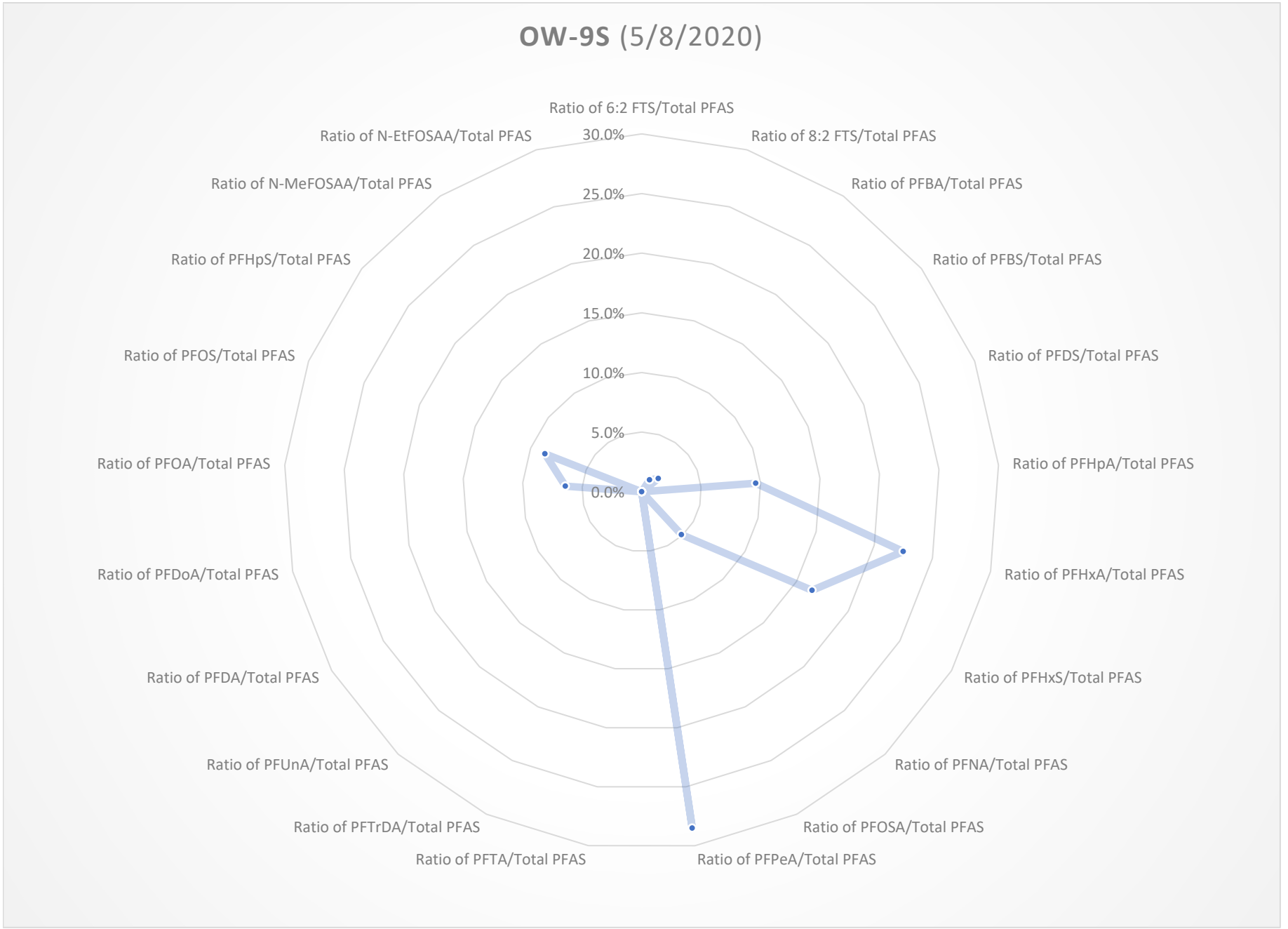
OW-9S (5/8/2020)
Ratio of 6:2 FTS/Total PFAS
Ratio of 8:2 FTS/Total PFAS
Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
Ratio of PFDS/Total PFAS
Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
30.0%
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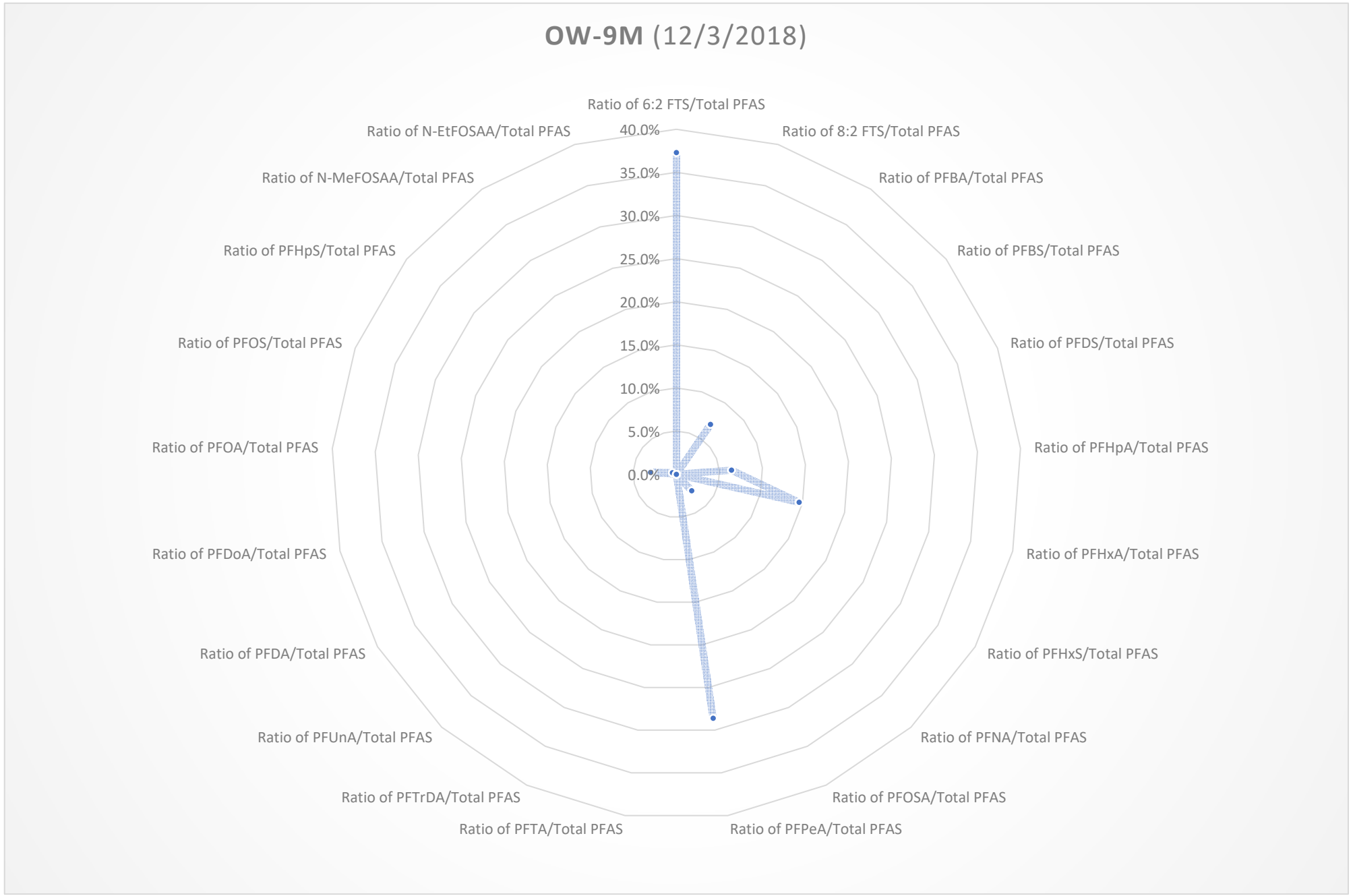
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Ratio of 8:2 FTS/Total PFAS
Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
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Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
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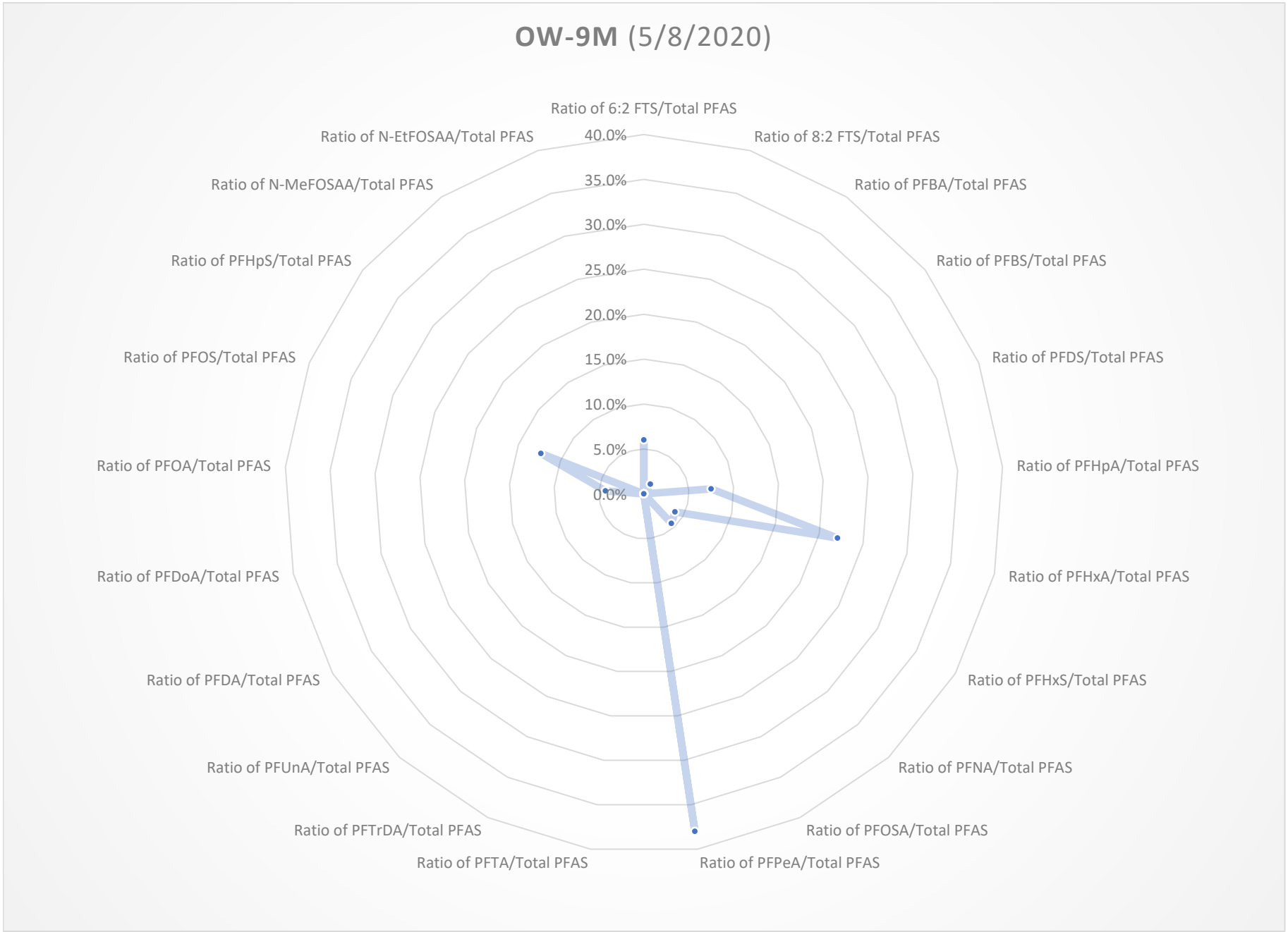
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Ratio of 6:2 FTS/Total PFAS
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Ratio of PFBA/Total PFAS
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Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
40.0%
35.0%
30.0%
25.0%
20.0%
15.0%
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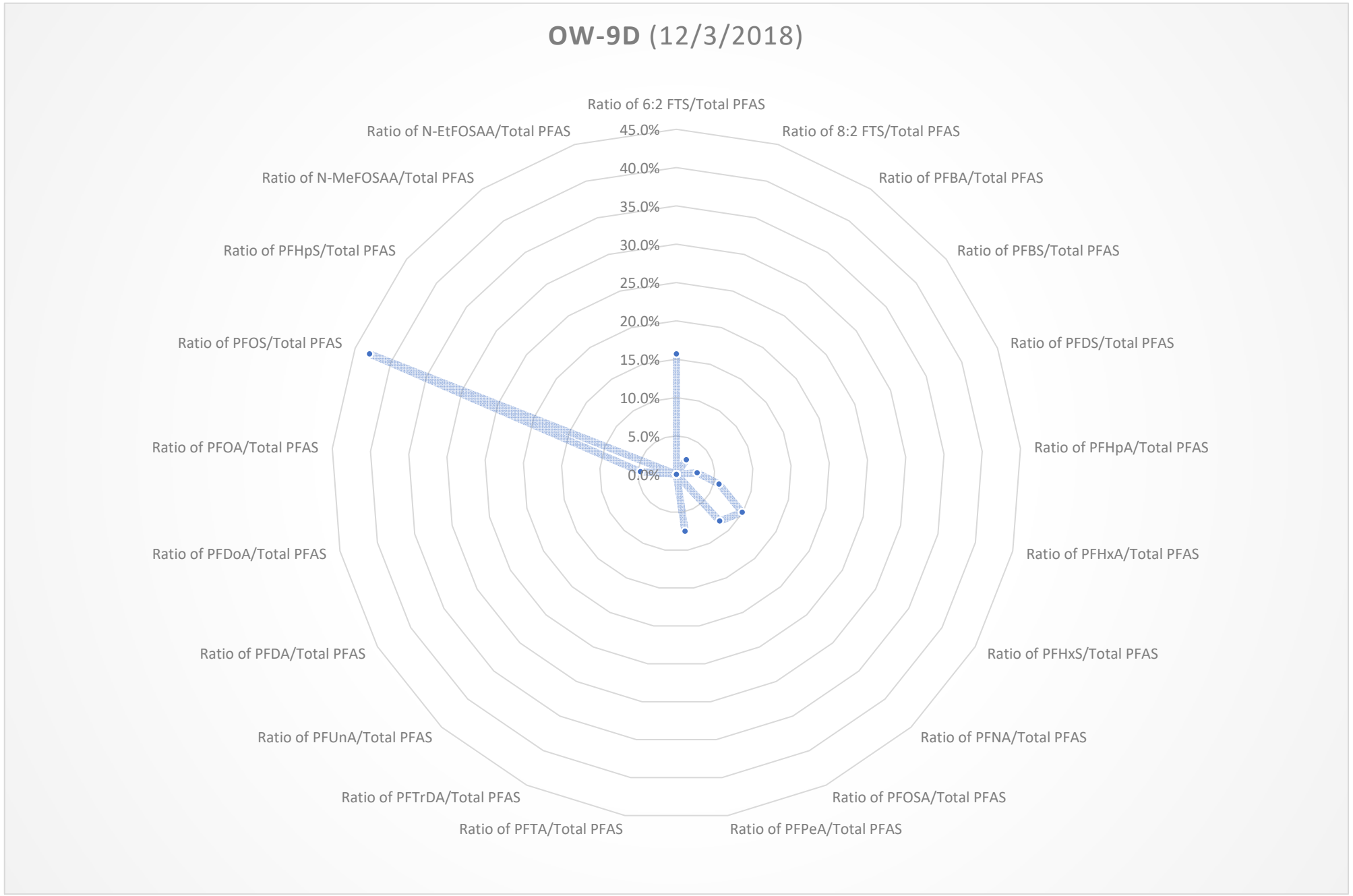
0.0%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Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
45.0%
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35.0%
30.0%
25.0%
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15.0%
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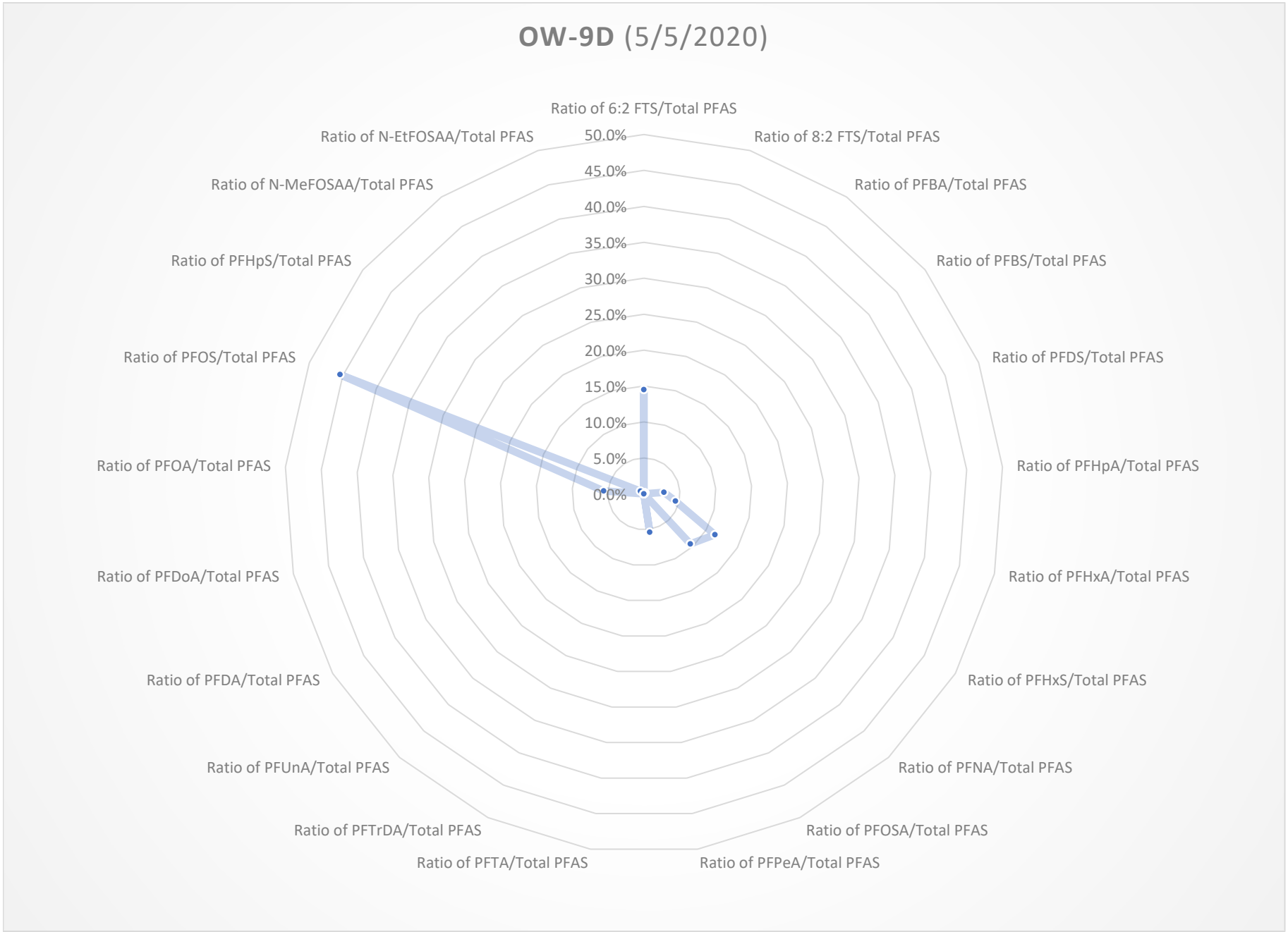
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Ratio of 8:2 FTS/Total PFAS
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Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
50.0%
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35.0%
30.0%
25.0%
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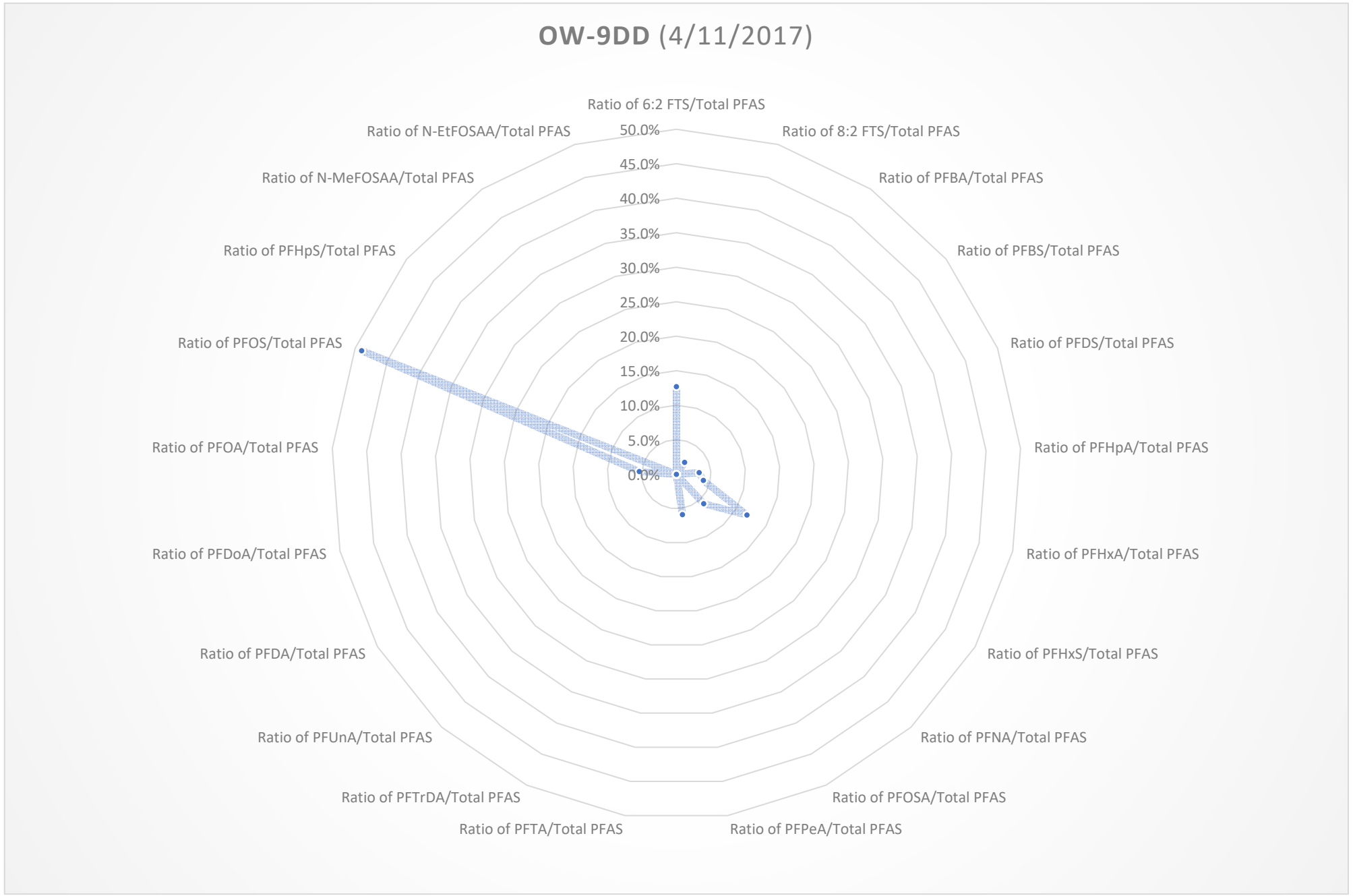
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Ratio of 8:2 FTS/Total PFAS
Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
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Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
50.0%
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35.0%
30.0%
25.0%
20.0%
15.0%
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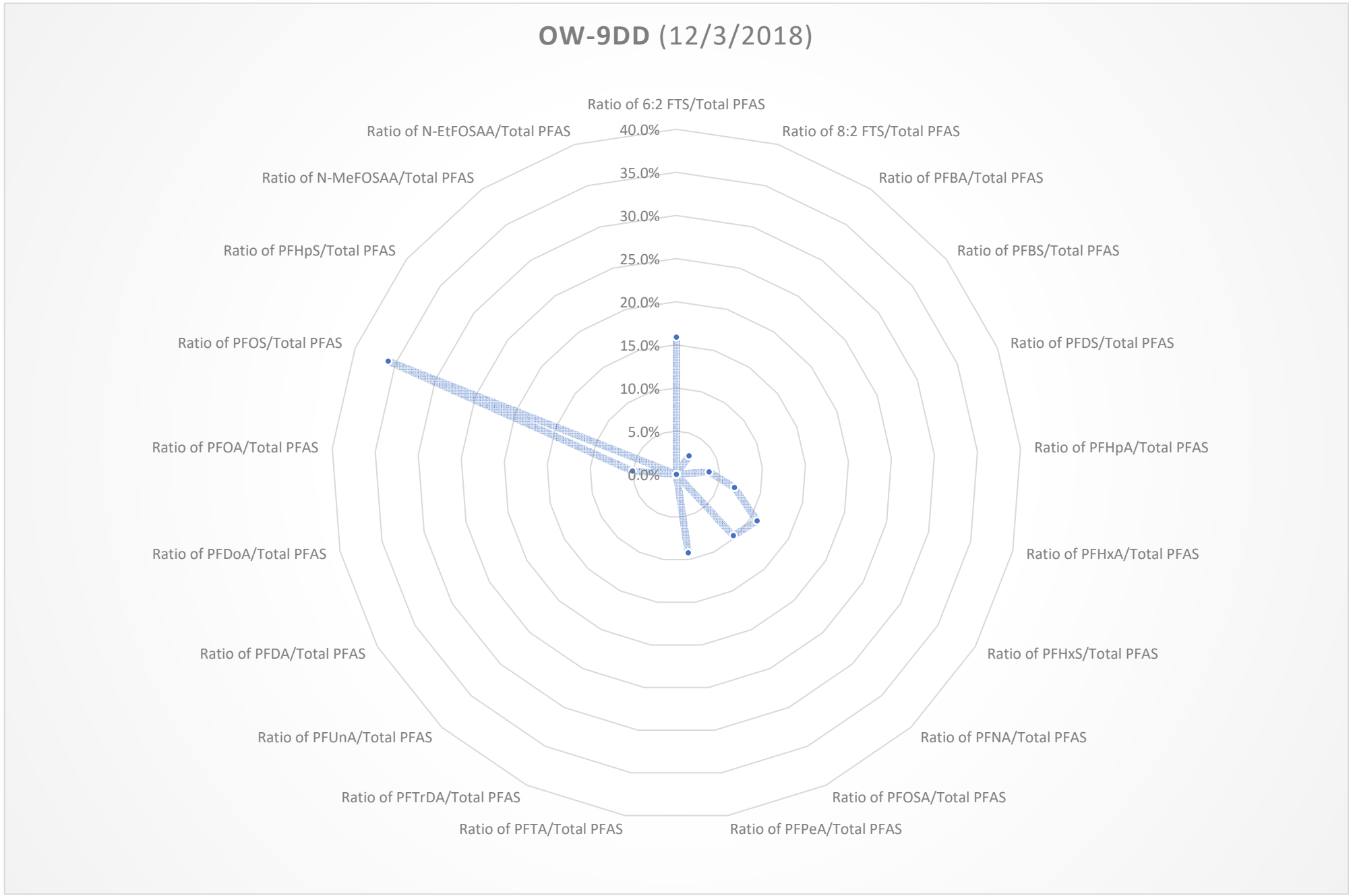
0.0%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Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
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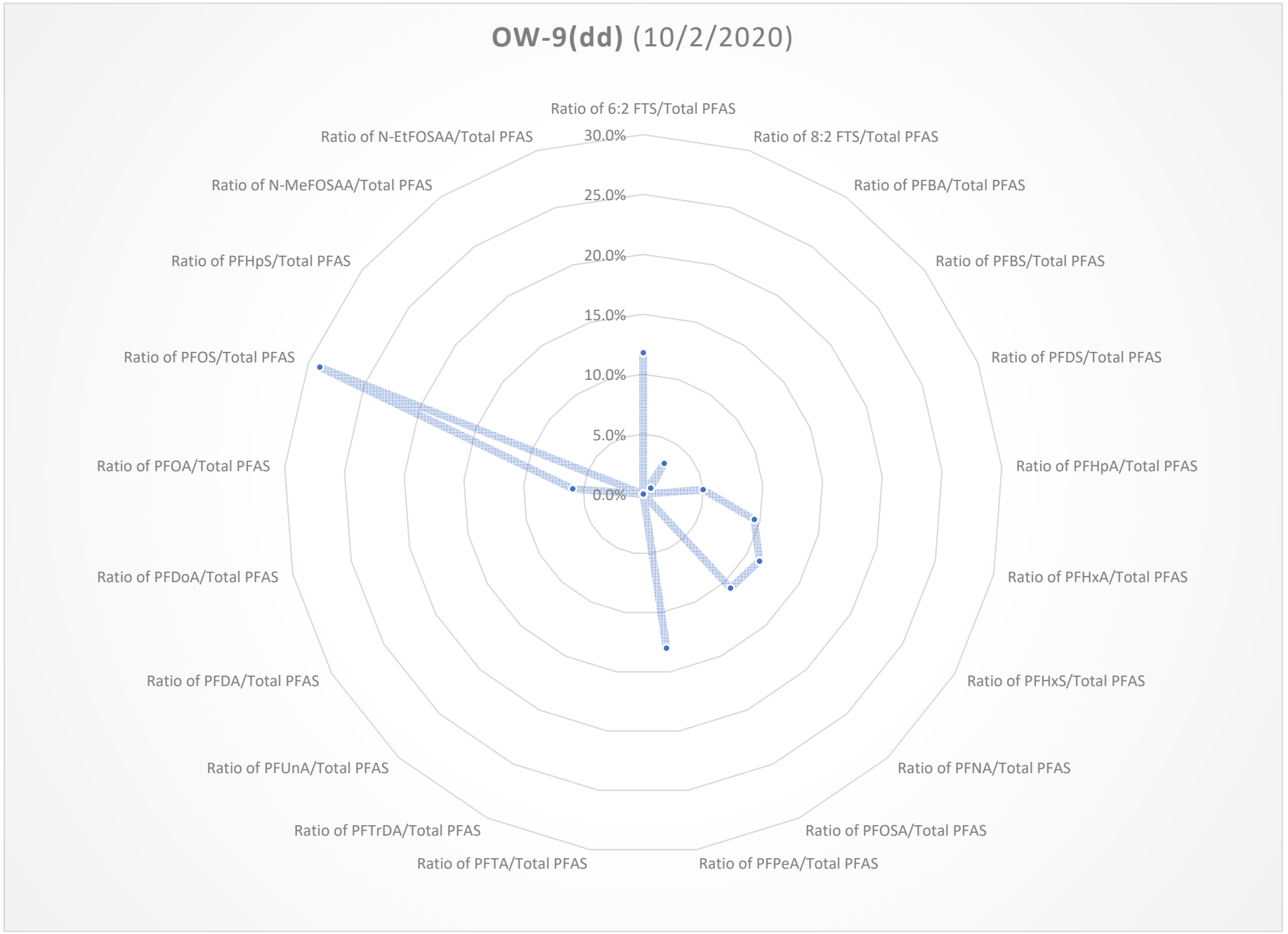
Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
40.0%
35.0%
30.0%
25.0%
20.0%
15.0%
10.0%
5.0%
0.0%


OW-9(dd) (10/2/2020)
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Ratio of 8:2 FTS/Total PFAS
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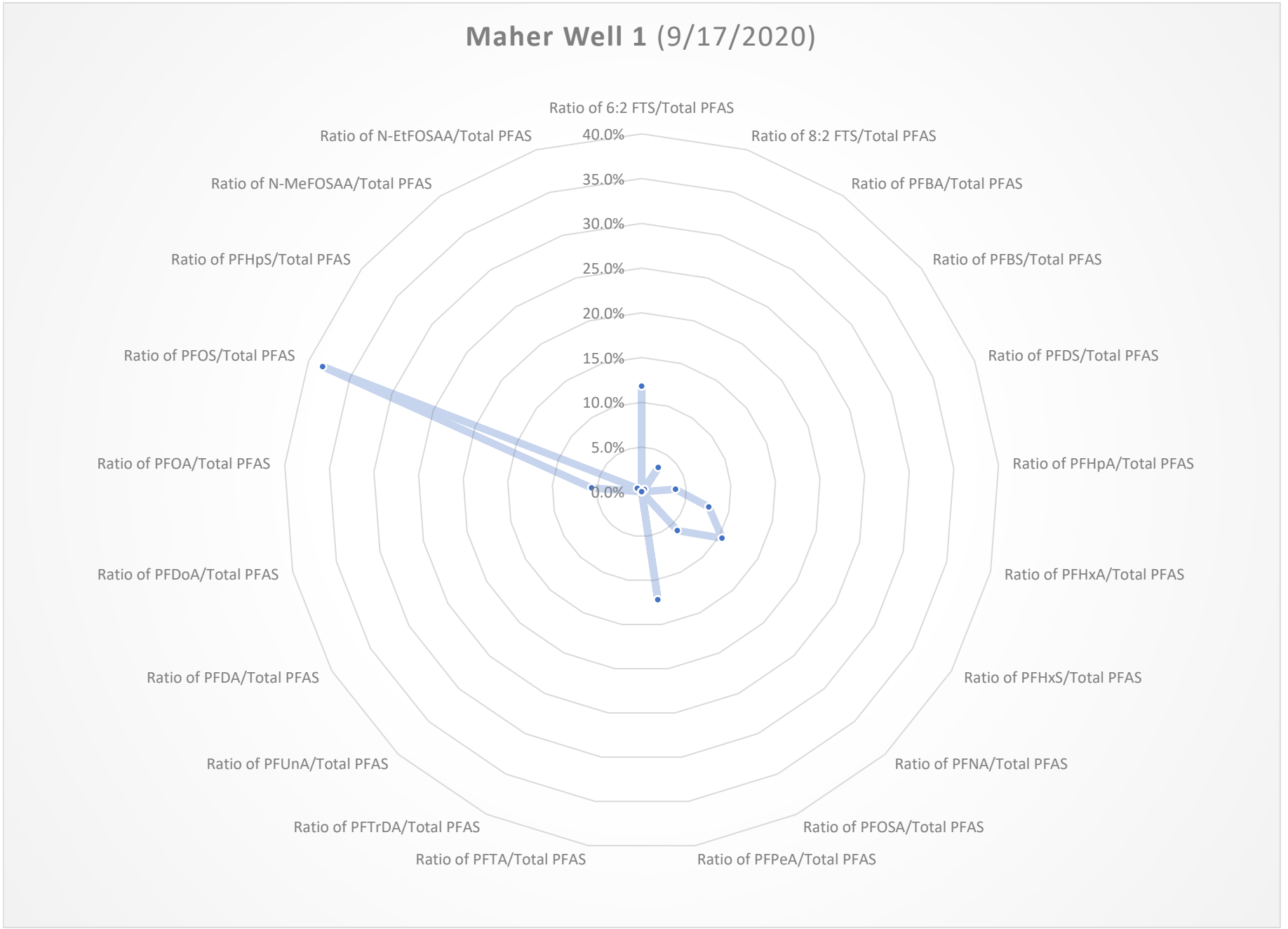
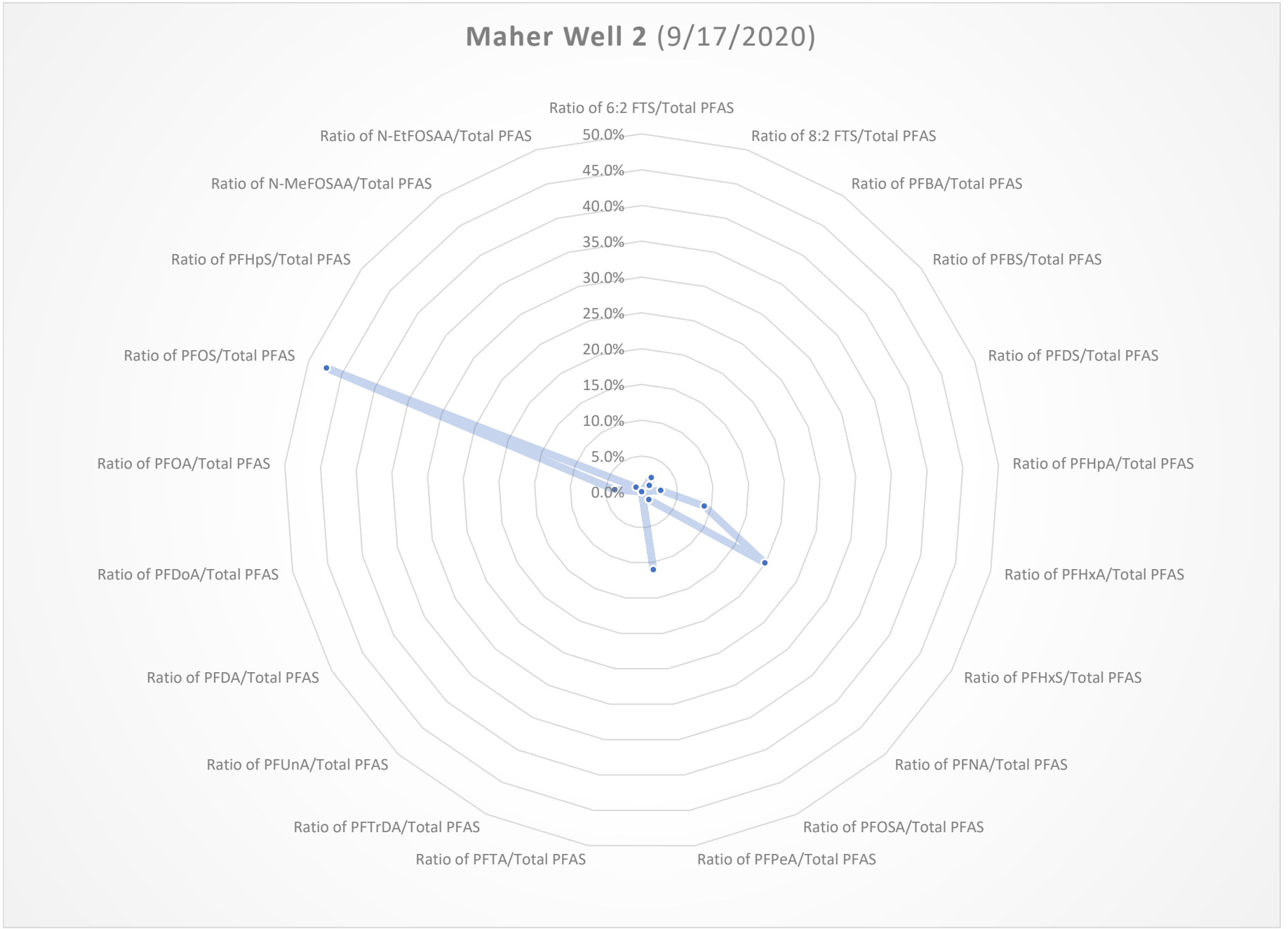
Ratio of PFBS/Total PFAS
Ratio of PFDS/Total PFAS
Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
30.0%
25.0%
20.0%
15.0%
10.0%
5.0%
0.0%


Maher Well 1 (9/17/2020)
Ratio of 6:2 FTS/Total PFAS
Ratio of 8:2 FTS/Total PFAS
Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
Ratio of PFDS/Total PFAS
Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
40.0%
35.0%
30.0%
25.0%
20.0%
15.0%
10.0%
5.0%
0.0%


Maher Well 2 (9/17/2020)
Ratio of 6:2 FTS/Total PFAS
Ratio of 8:2 FTS/Total PFAS
Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
Ratio of PFDS/Total PFAS
Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
50.0%
45.0%
40.0%
35.0%
30.0%
25.0%
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15.0%
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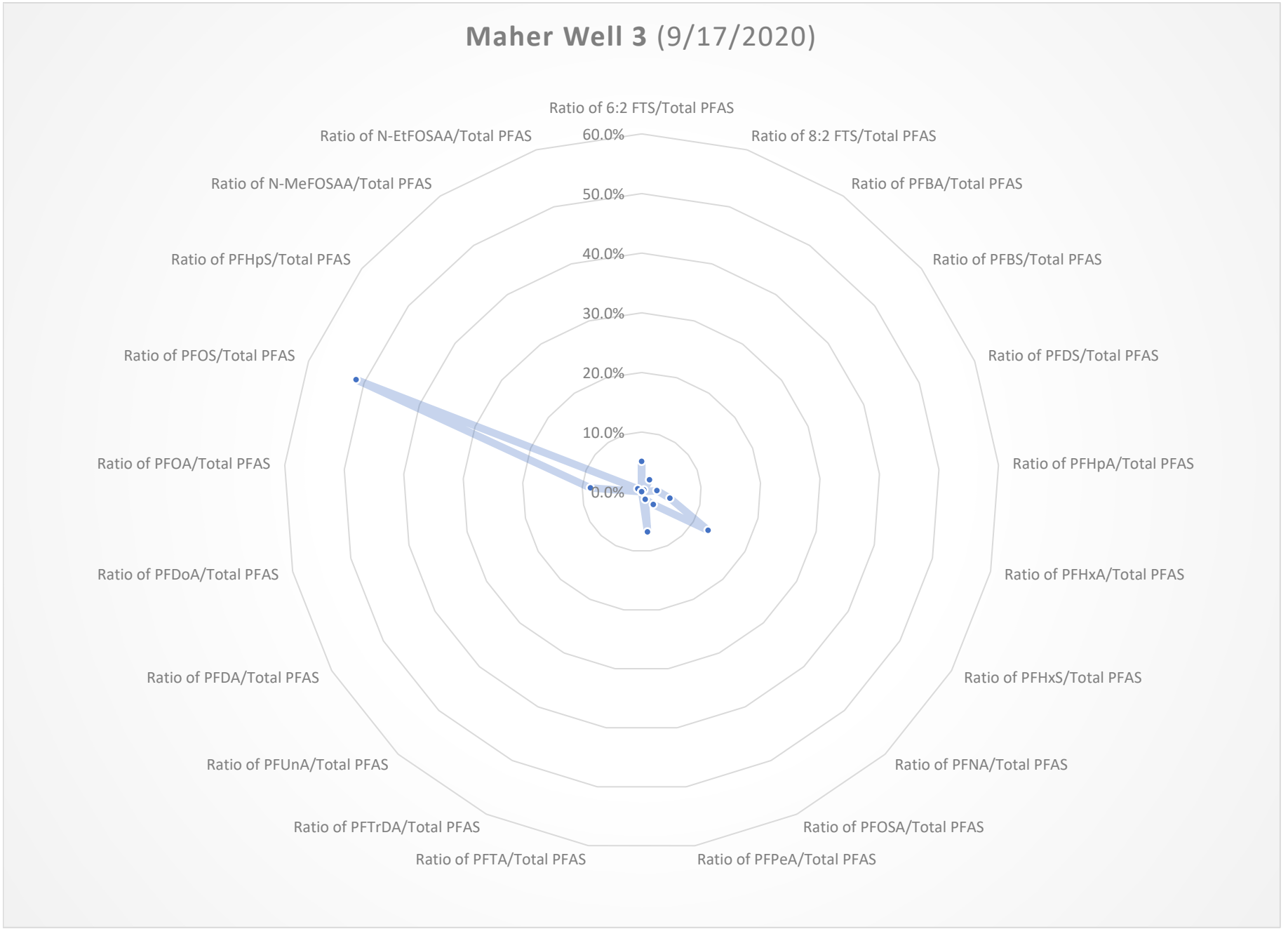
Maher Well 3 (9/17/2020)
Ratio of 6:2 FTS/Total PFAS
Ratio of 8:2 FTS/Total PFAS
Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
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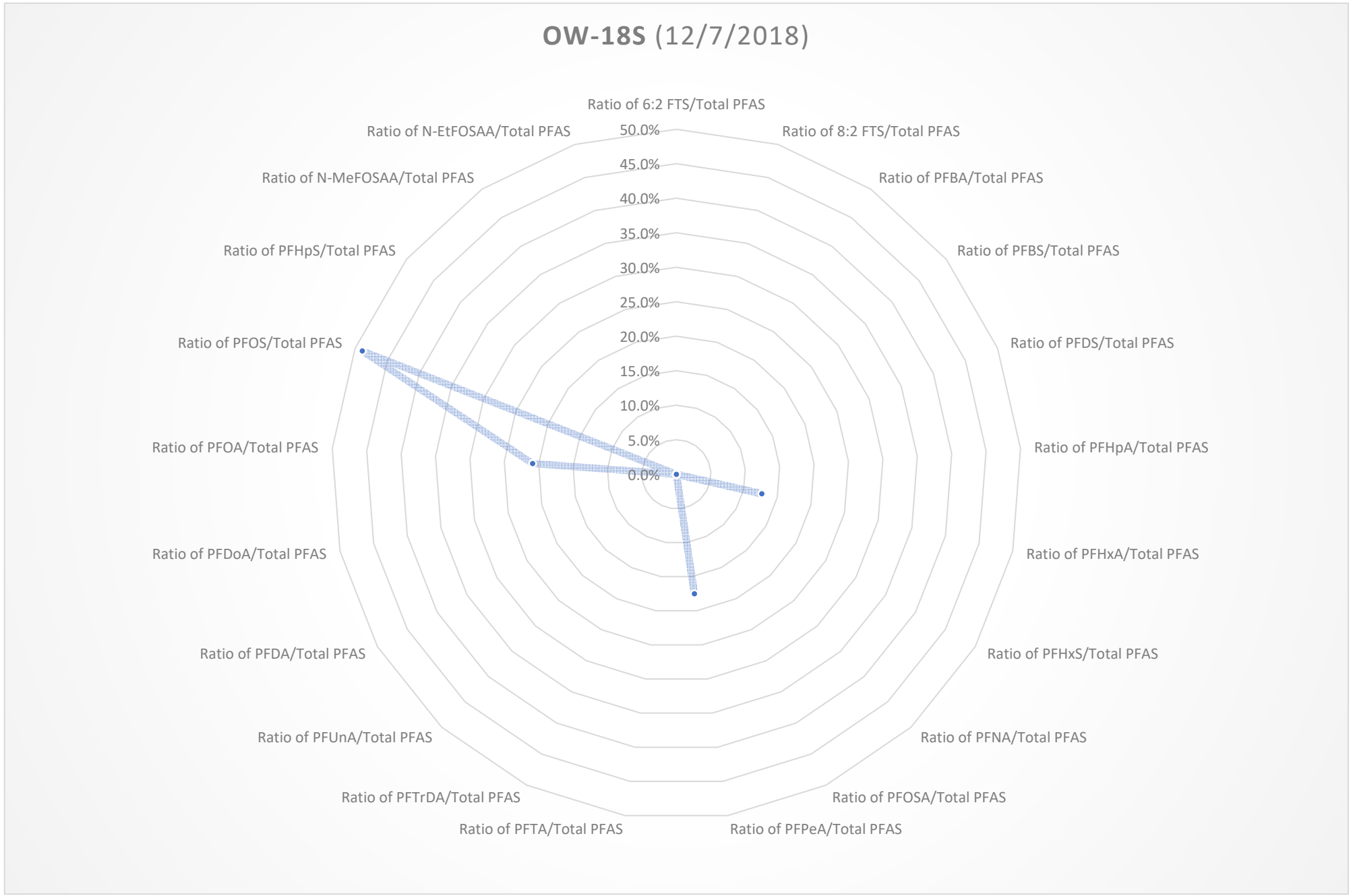
Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%


OW-18S (12/7/2018)
Ratio of 6:2 FTS/Total PFAS
Ratio of 8:2 FTS/Total PFAS
Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
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Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
50.0%
45.0%
40.0%
35.0%
30.0%
25.0%
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15.0%
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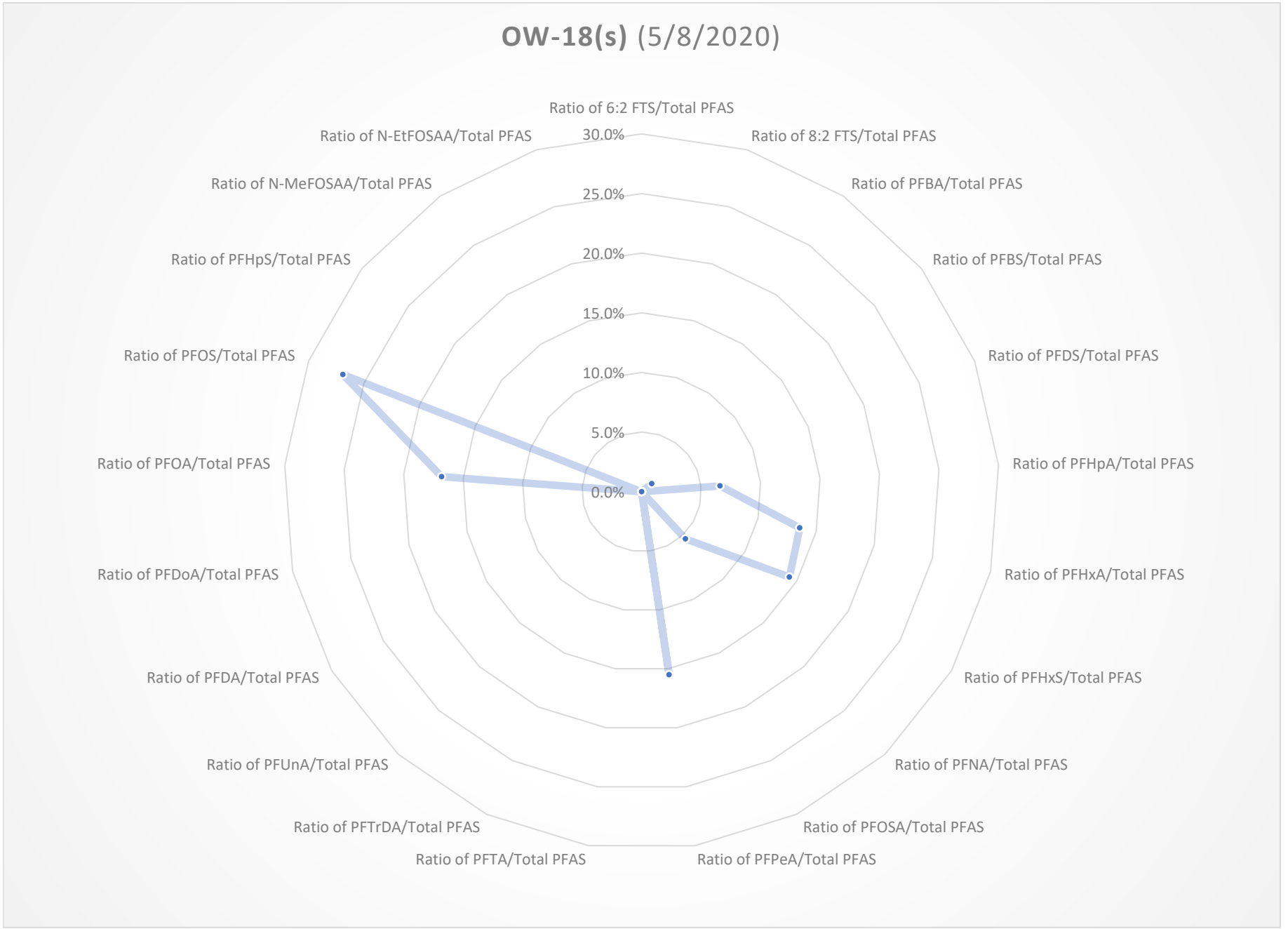
0.0%


OW-18(s) (5/8/2020)
Ratio of 6:2 FTS/Total PFAS
Ratio of 8:2 FTS/Total PFAS
Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
Ratio of PFDS/Total PFAS
Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
30.0%
25.0%
20.0%
15.0%
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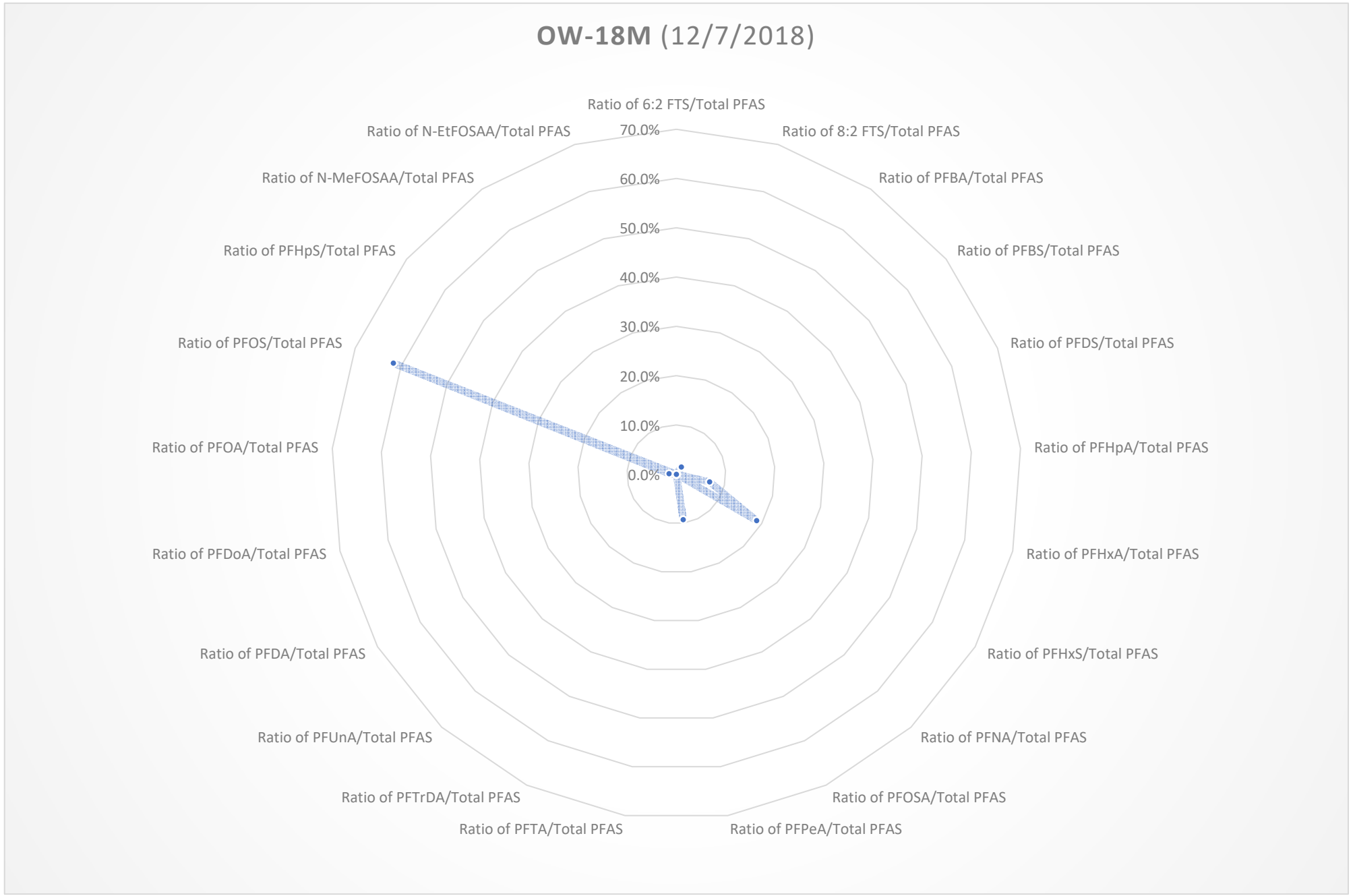
5.0%
0.0%


OW-18M (12/7/2018)
Ratio of 6:2 FTS/Total PFAS
Ratio of 8:2 FTS/Total PFAS
Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
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Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
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60.0%
50.0%
40.0%
30.0%
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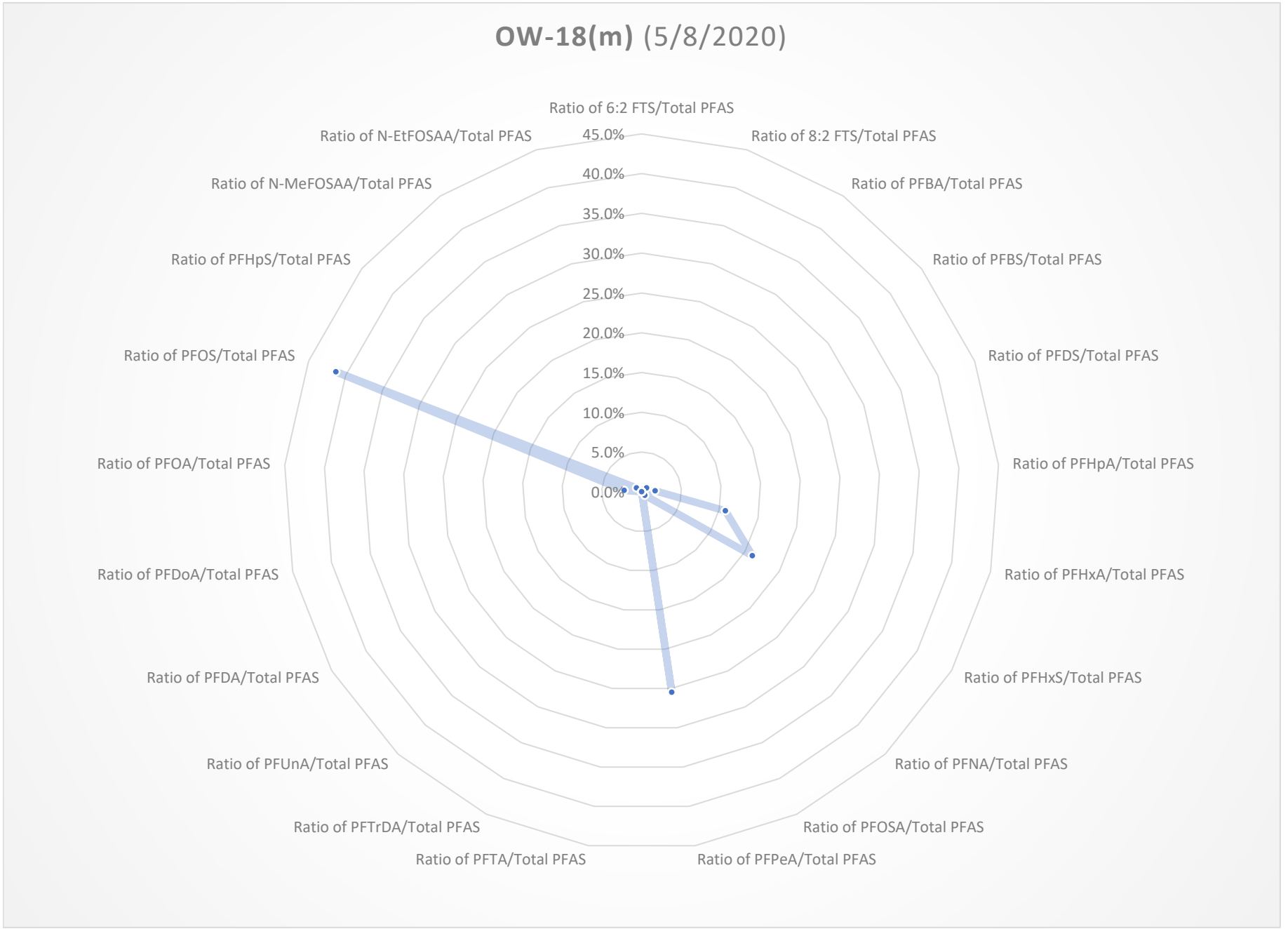
0.0%


OW-18(m) (5/8/2020)
Ratio of 6:2 FTS/Total PFAS
Ratio of 8:2 FTS/Total PFAS
Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
Ratio of PFDS/Total PFAS
Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
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40.0%
35.0%
30.0%
25.0%
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15.0%
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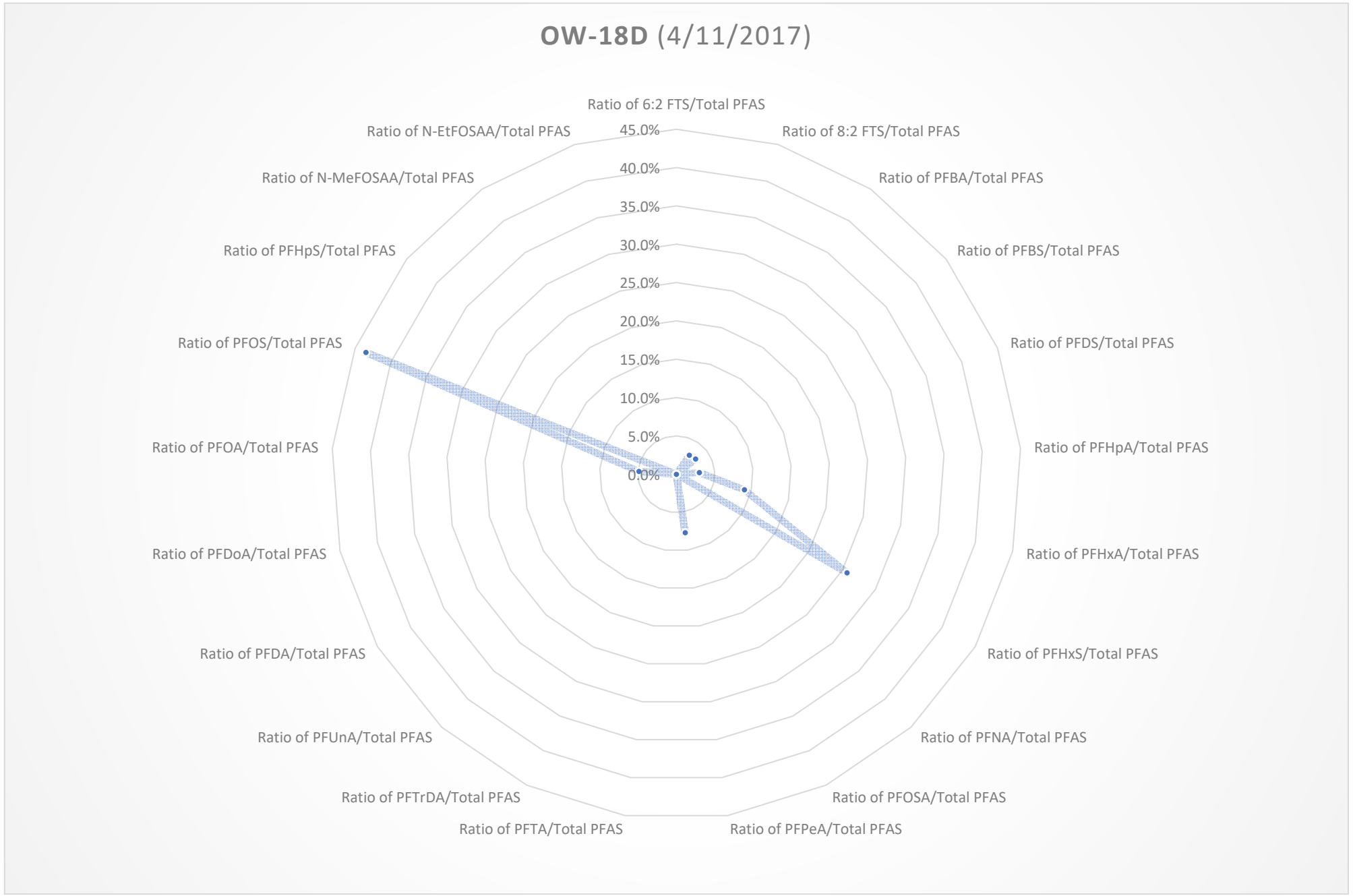
OW-18D (4/11/2017)
Ratio of 6:2 FTS/Total PFAS
Ratio of 8:2 FTS/Total PFAS
Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
Ratio of PFDS/Total PFAS
Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
45.0%
40.0%
35.0%
30.0%
25.0%
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15.0%
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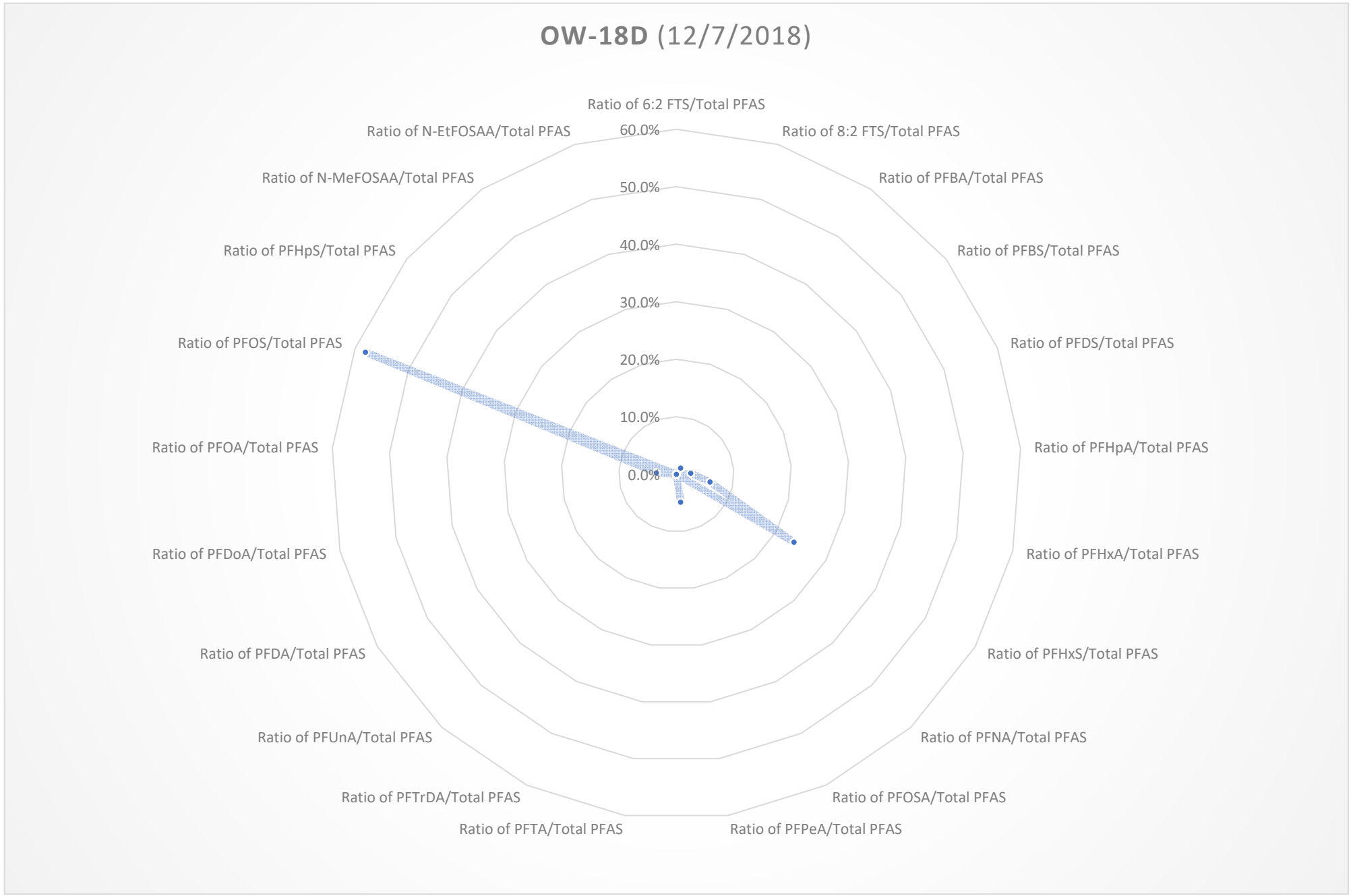
OW-18D (12/7/2018)
Ratio of 6:2 FTS/Total PFAS
Ratio of 8:2 FTS/Total PFAS
Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
Ratio of PFDS/Total PFAS
Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
60.0%
50.0%
40.0%
30.0%
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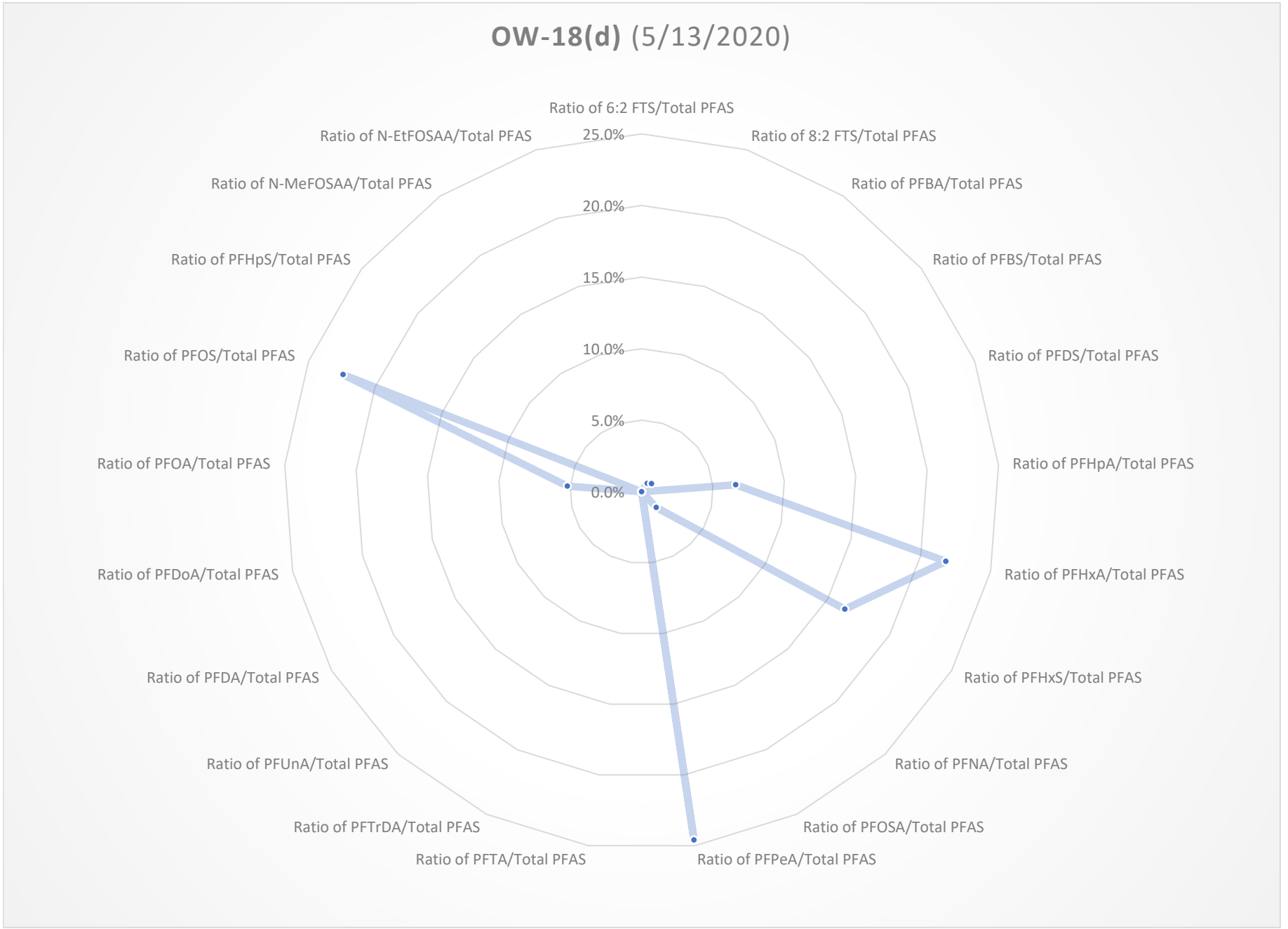
0.0%


OW-18(d) (5/13/2020)
Ratio of 6:2 FTS/Total PFAS
Ratio of 8:2 FTS/Total PFAS
Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
Ratio of PFDS/Total PFAS
Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
25.0%
20.0%
15.0%
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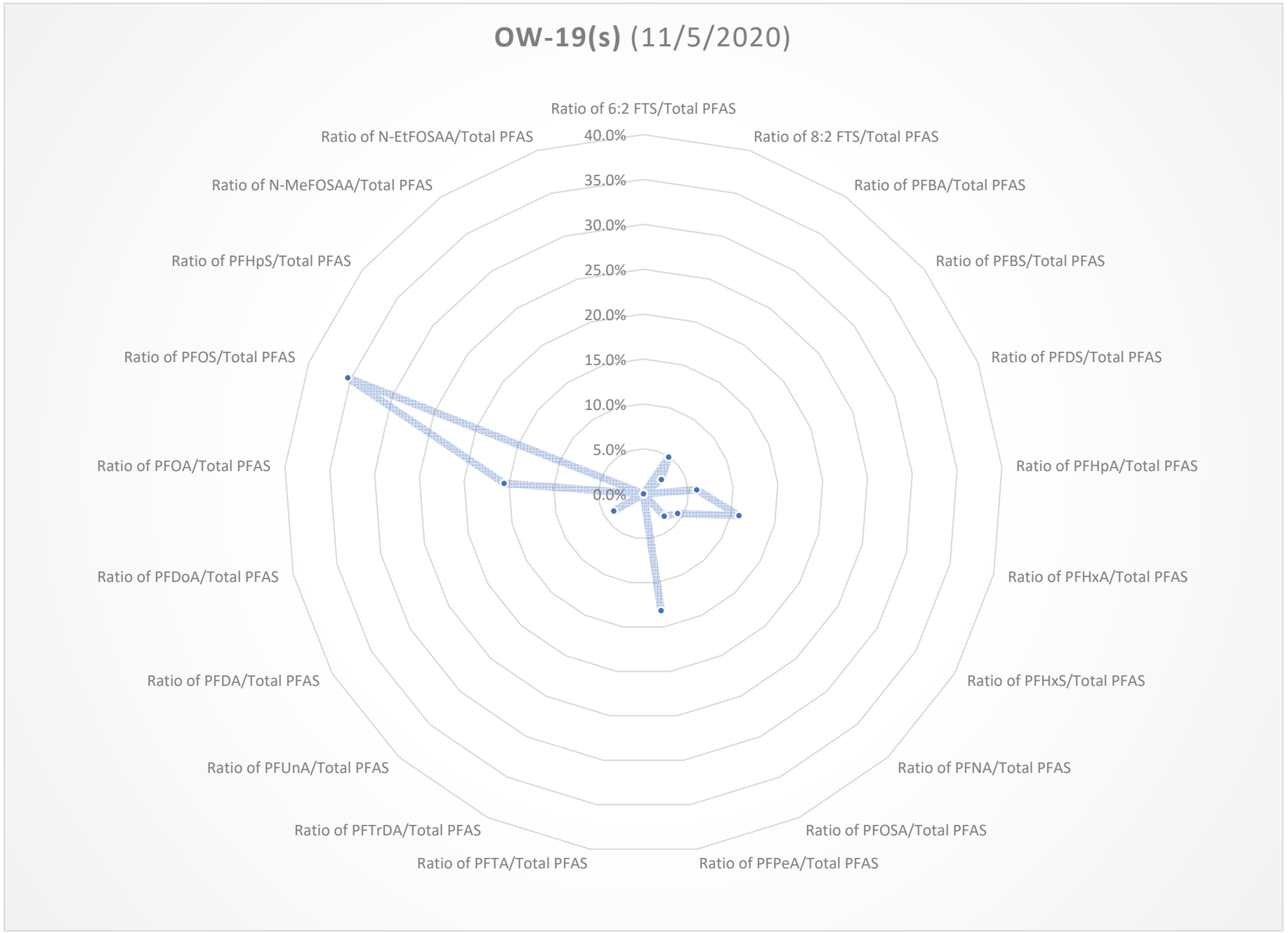
OW-19(s) (11/5/2020)
Ratio of 6:2 FTS/Total PFAS
Ratio of 8:2 FTS/Total PFAS
Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
Ratio of PFDS/Total PFAS
Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
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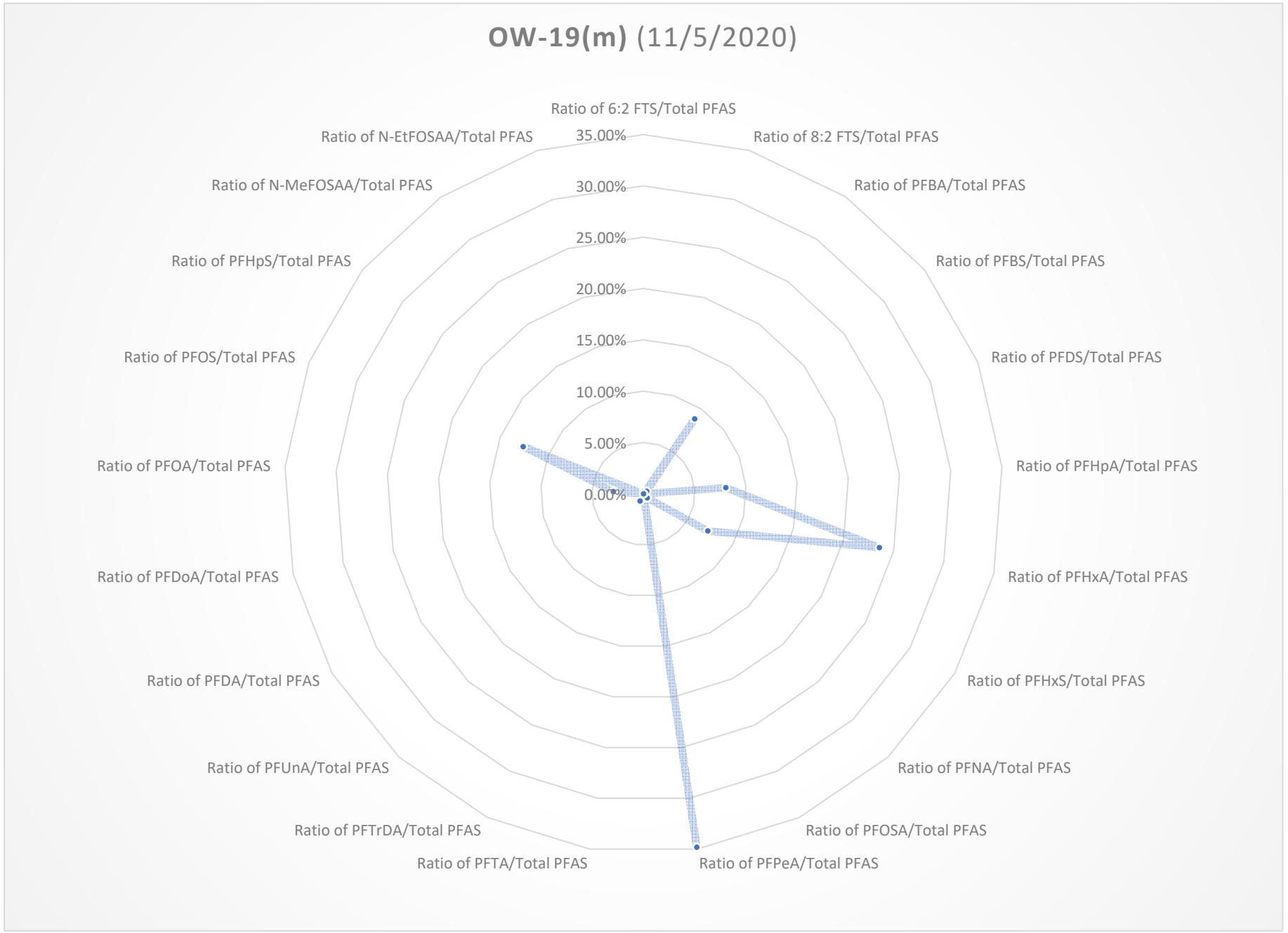
OW-19(m) (11/5/2020)
Ratio of 6:2 FTS/Total PFAS
Ratio of 8:2 FTS/Total PFAS
Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
Ratio of PFDS/Total PFAS
Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
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25.00%
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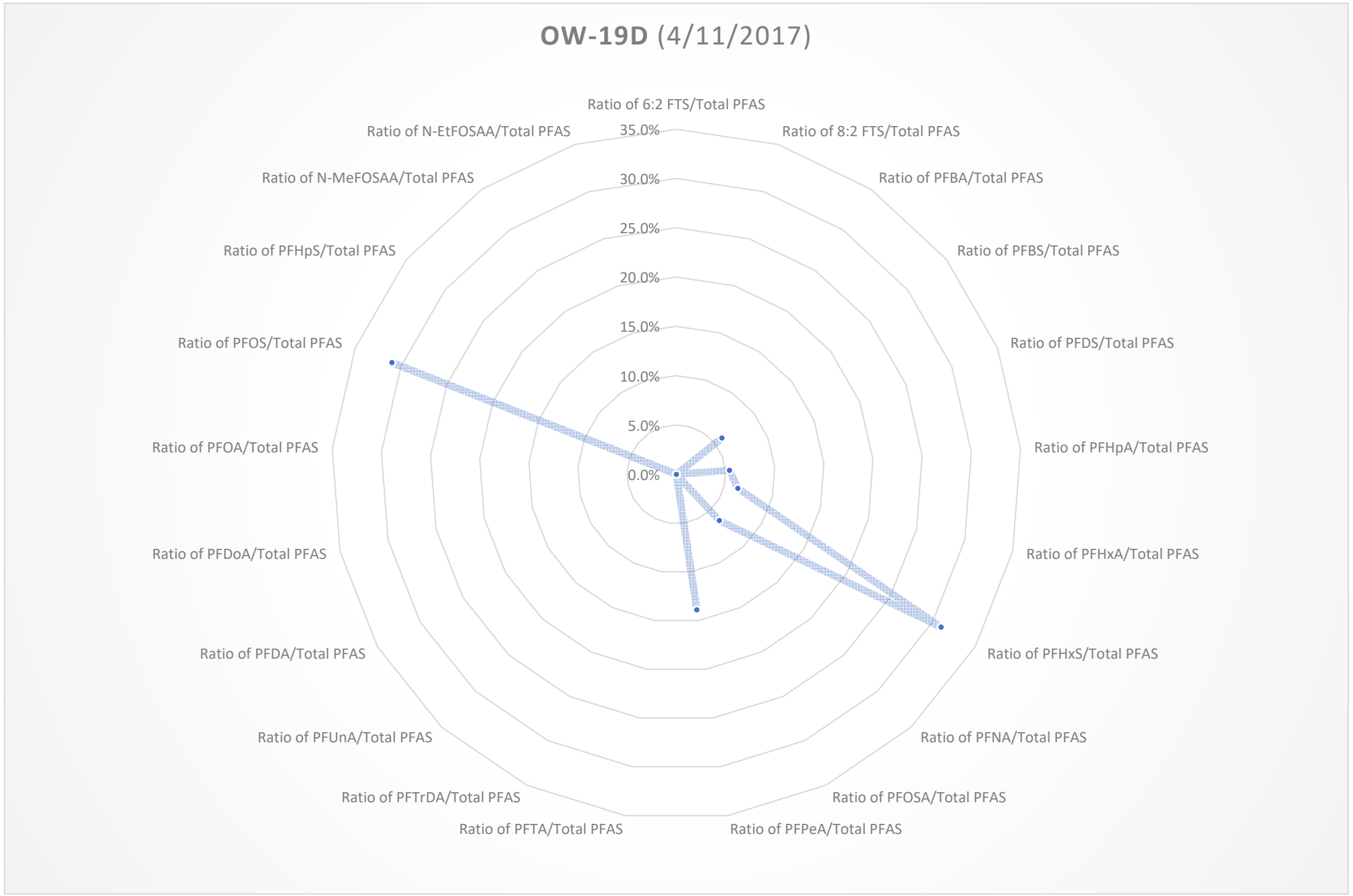
OW-19D (4/11/2017)
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Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
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Ratio of PFPeA/Total PFAS
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Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
35.0%
30.0%
25.0%
20.0%
15.0%
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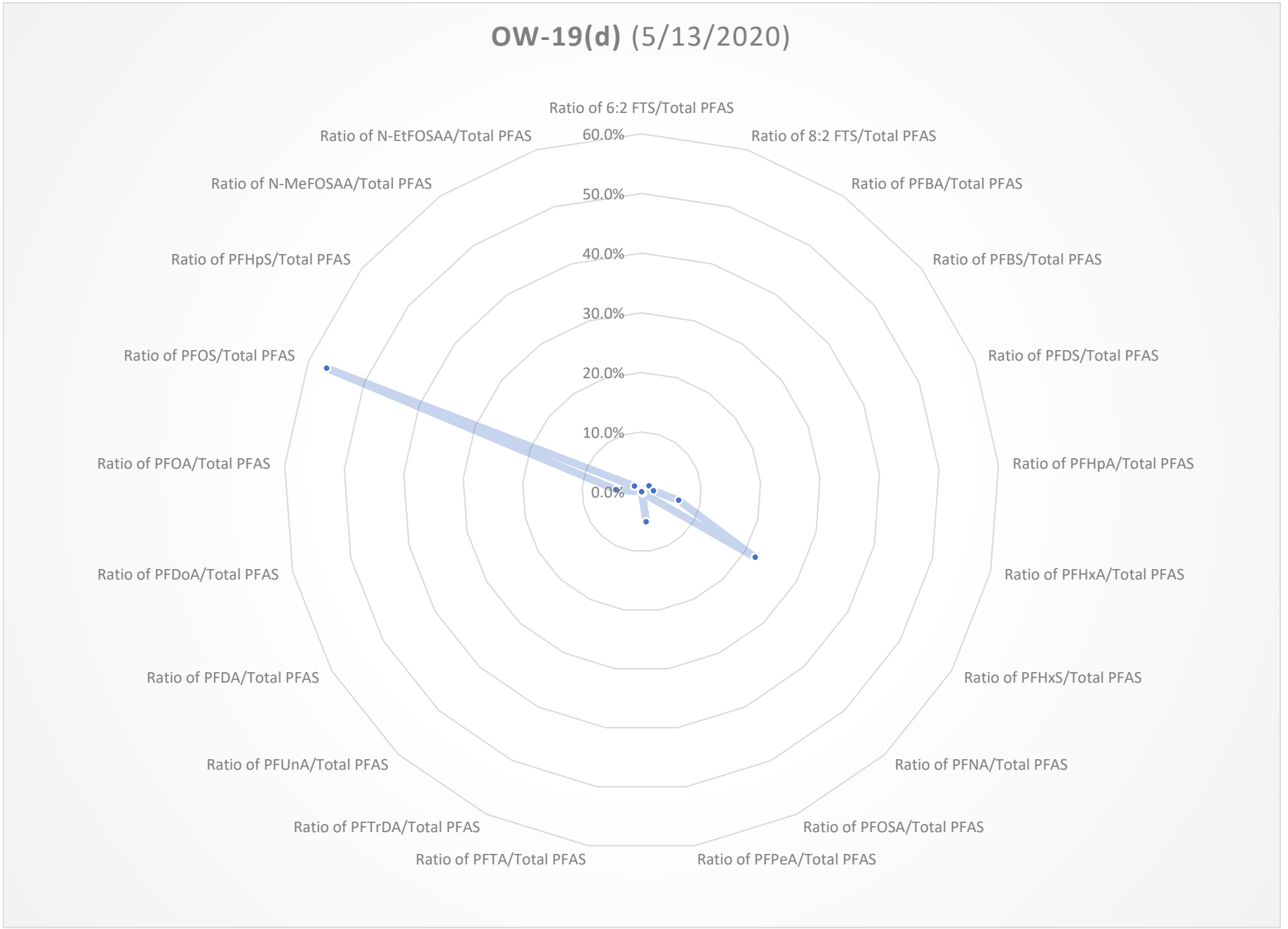
OW-19(d) (5/13/2020)
Ratio of 6:2 FTS/Total PFAS
Ratio of 8:2 FTS/Total PFAS
Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
Ratio of PFDS/Total PFAS
Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
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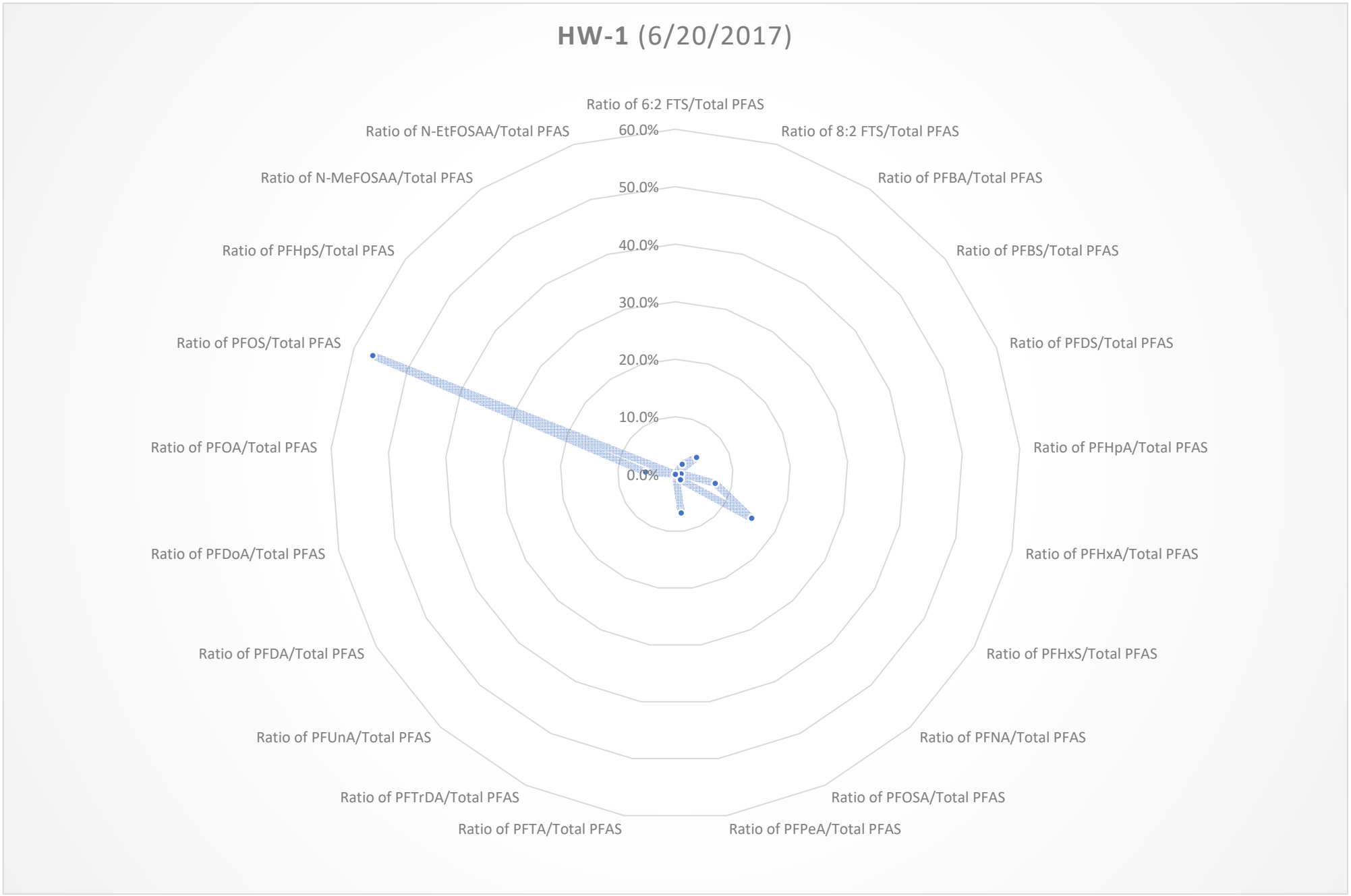
HW-1 (6/20/2017)
Ratio of 6:2 FTS/Total PFAS
Ratio of 8:2 FTS/Total PFAS
Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
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Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
60.0%
50.0%
40.0%
30.0%
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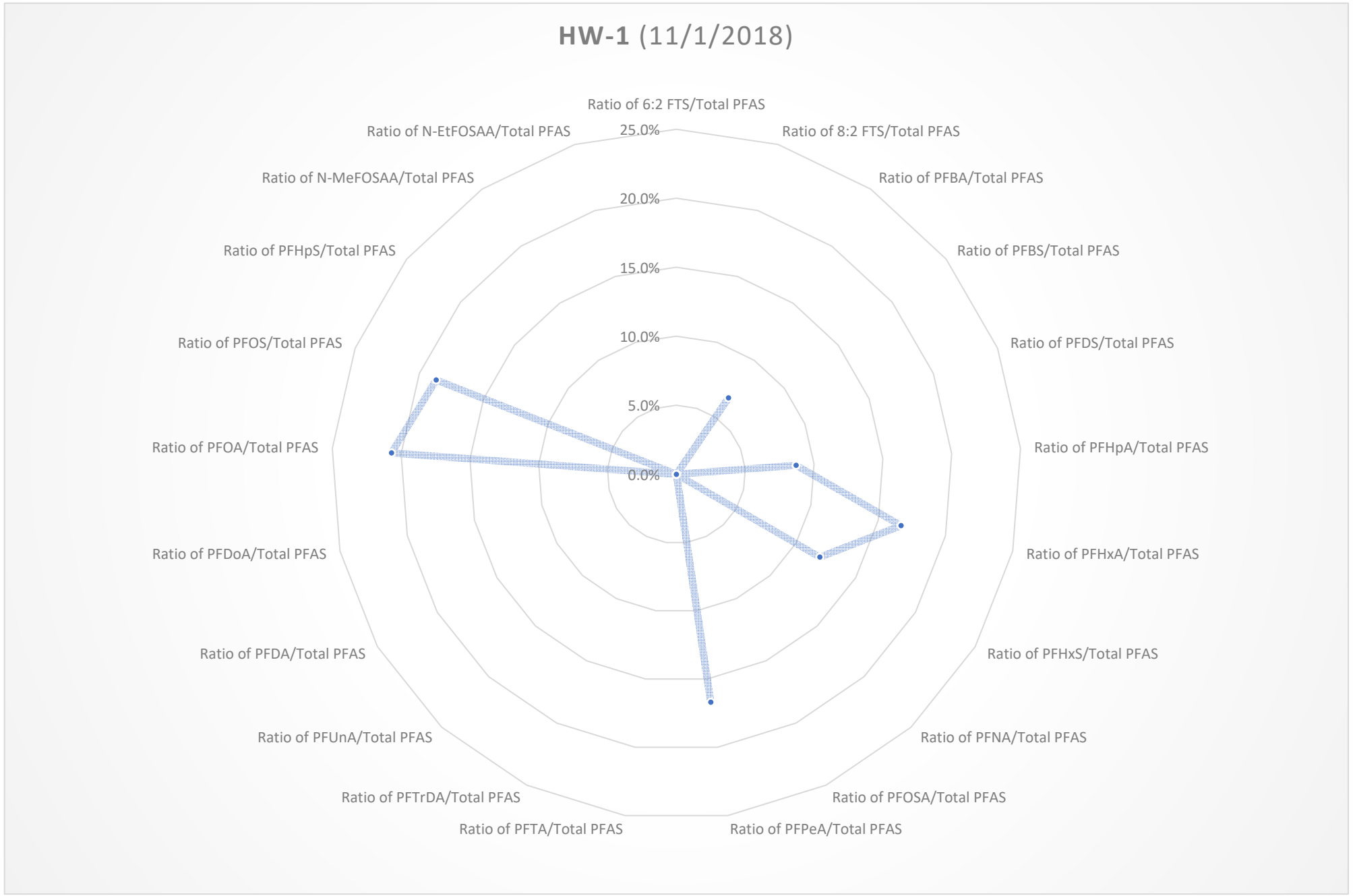
HW-1 (11/1/2018)
Ratio of 6:2 FTS/Total PFAS
Ratio of 8:2 FTS/Total PFAS
Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
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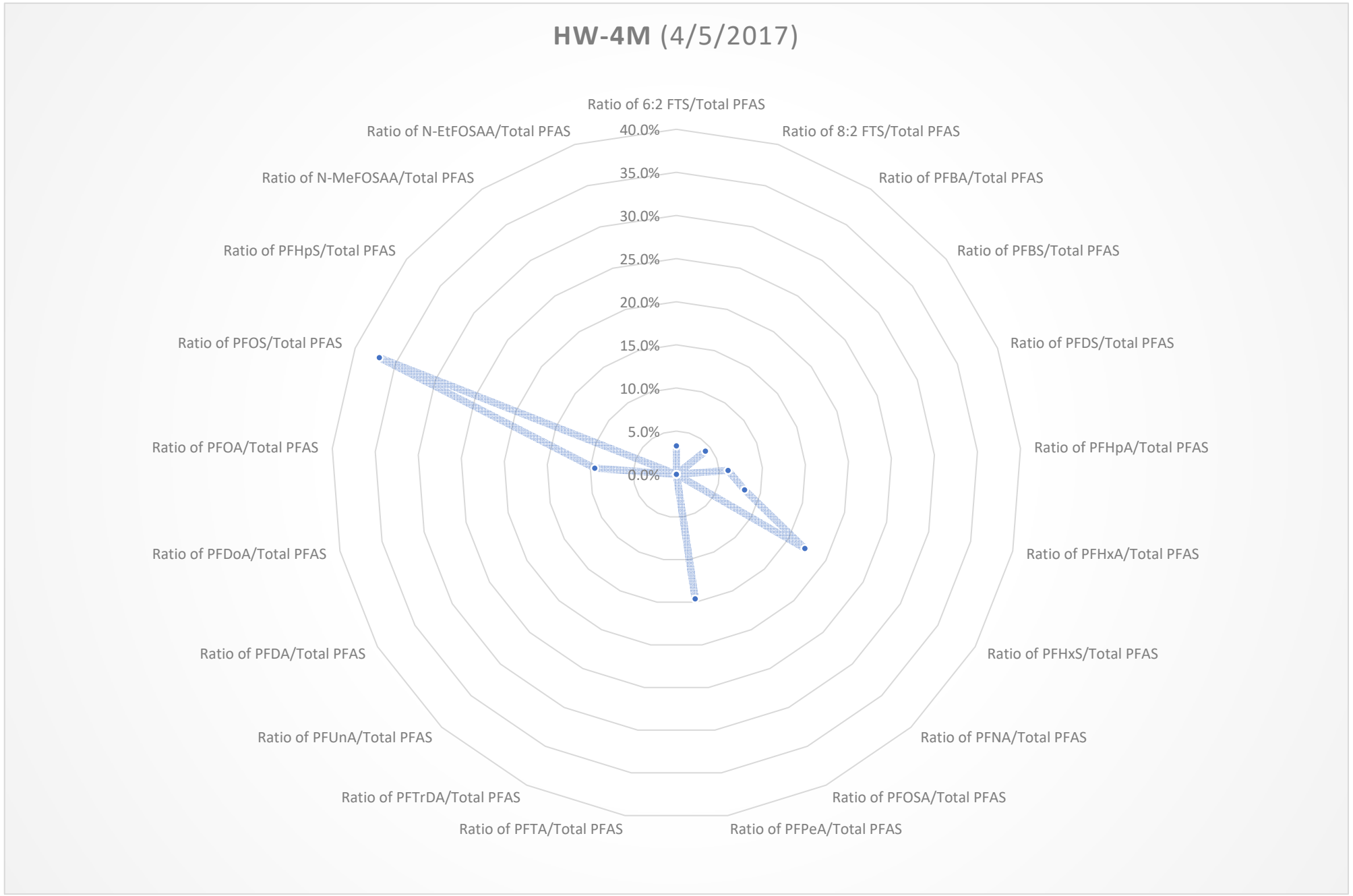
Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
25.0%
20.0%
15.0%
10.0%
5.0%
0.0%


HW-4M (4/5/2017)
Ratio of 6:2 FTS/Total PFAS
Ratio of 8:2 FTS/Total PFAS
Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
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Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
40.0%
35.0%
30.0%
25.0%
20.0%
15.0%
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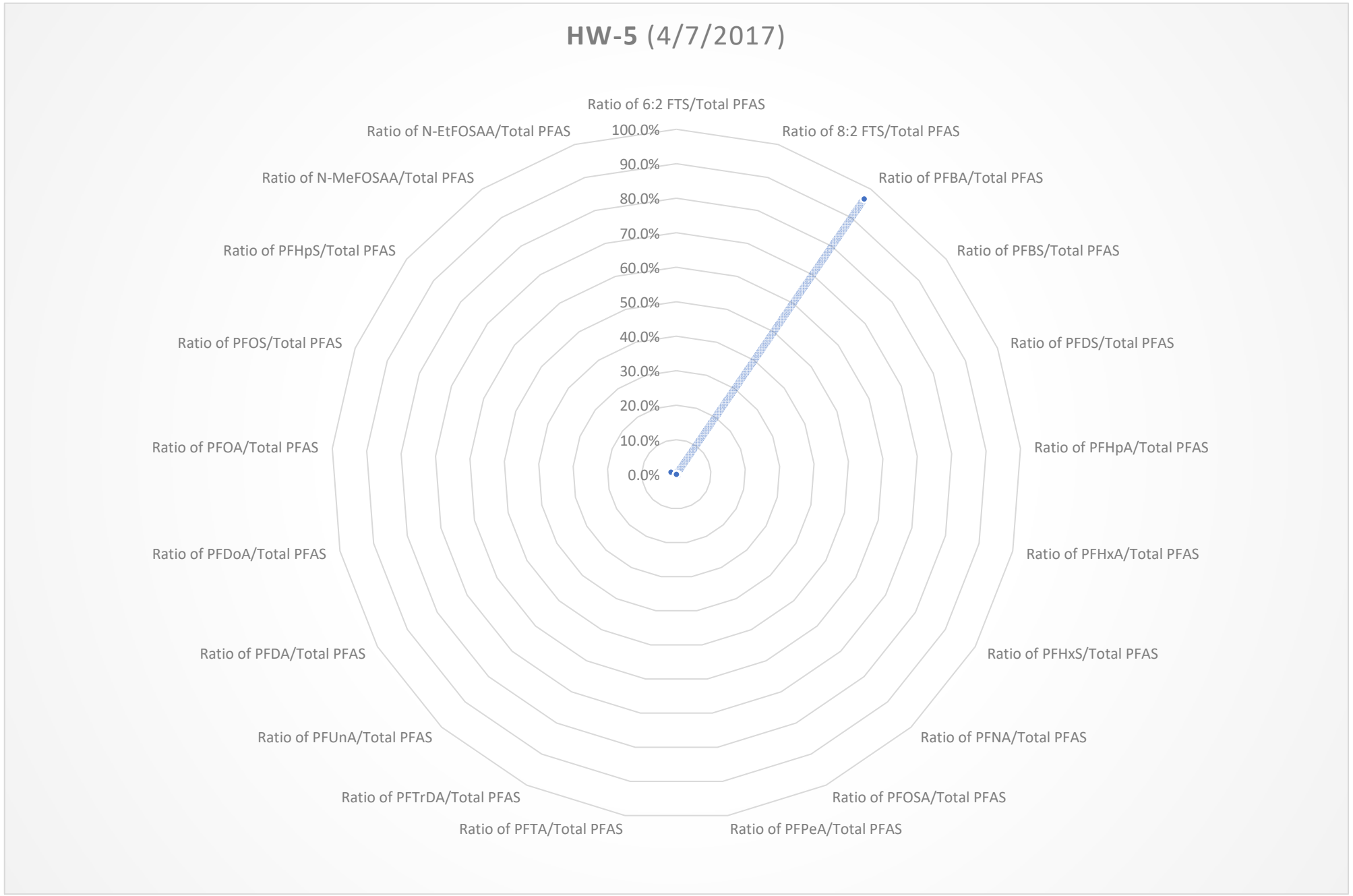
0.0%


HW-5 (4/7/2017)
Ratio of 6:2 FTS/Total PFAS
Ratio of 8:2 FTS/Total PFAS
Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
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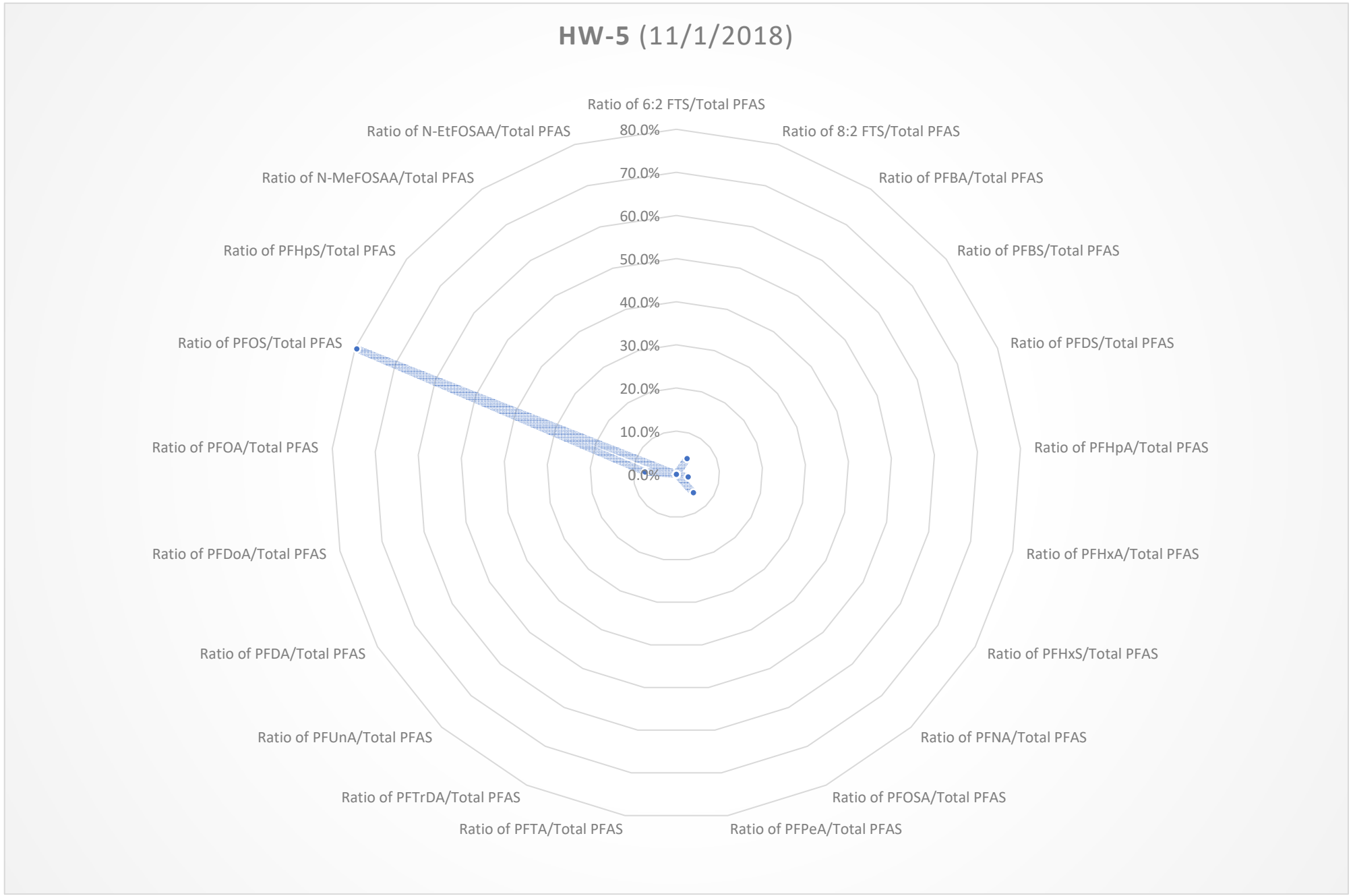
Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
100.0%
90.0%
80.0%
70.0%
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%


HW-5 (11/1/2018)
Ratio of 6:2 FTS/Total PFAS
Ratio of 8:2 FTS/Total PFAS
Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
Ratio of PFDS/Total PFAS
Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
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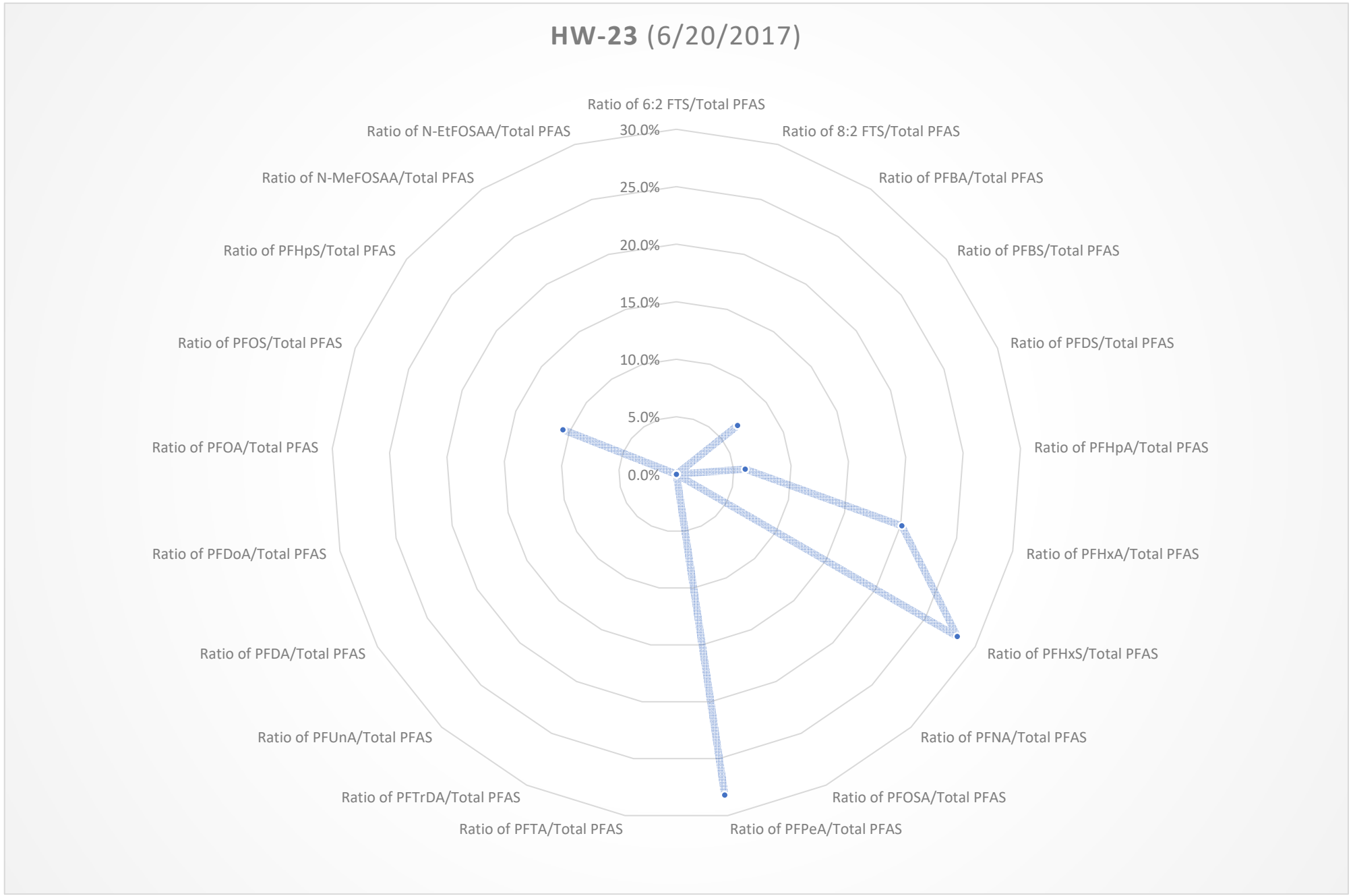
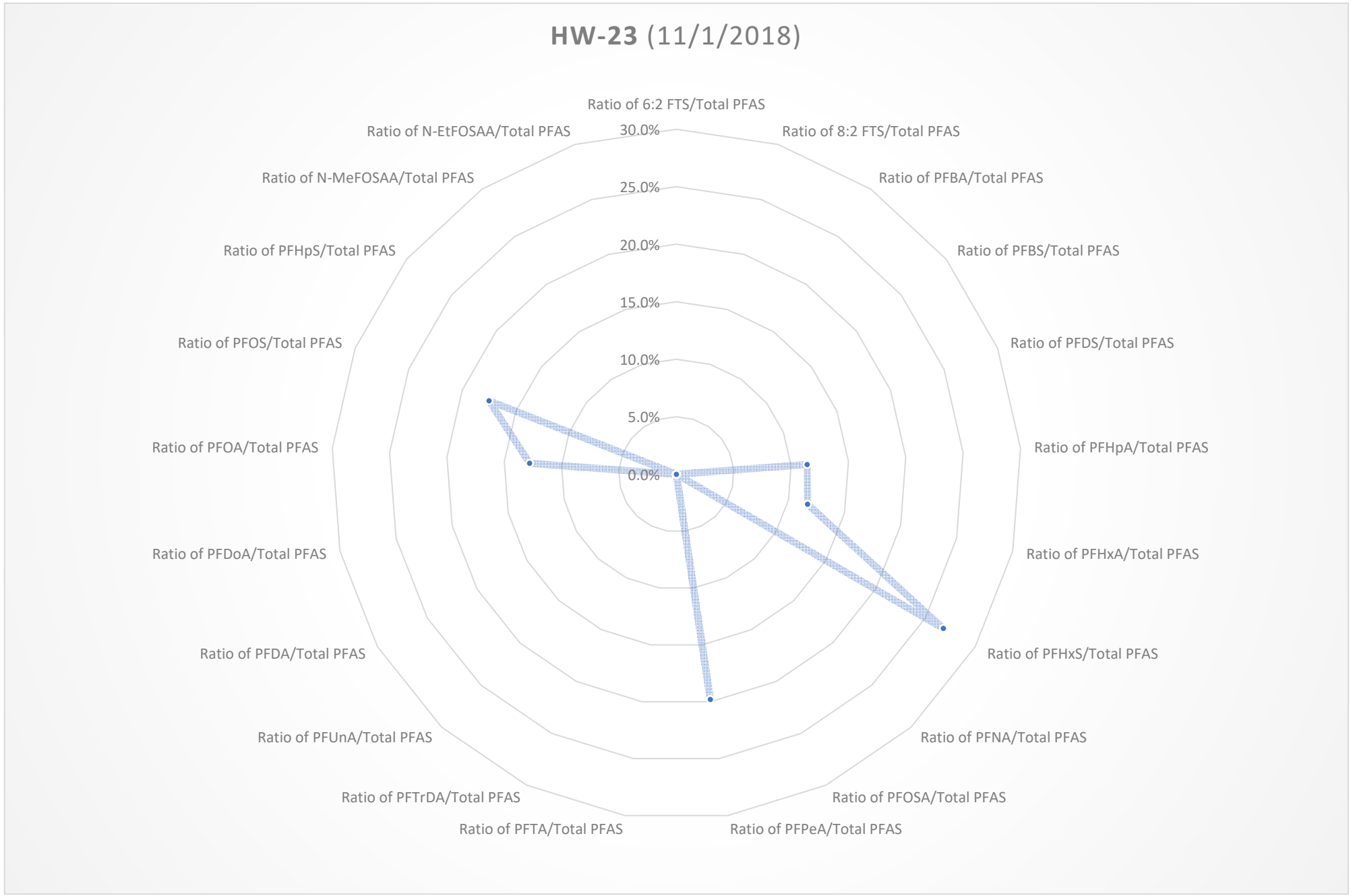
70.0%
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%


HW-23 (6/20/2017)
Ratio of 6:2 FTS/Total PFAS
Ratio of 8:2 FTS/Total PFAS
Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
Ratio of PFDS/Total PFAS
Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
30.0%
25.0%
20.0%
15.0%
10.0%
5.0%
0.0%


HW-23 (11/1/2018)
Ratio of 6:2 FTS/Total PFAS
Ratio of 8:2 FTS/Total PFAS
Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
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Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
30.0%
25.0%
20.0%
15.0%
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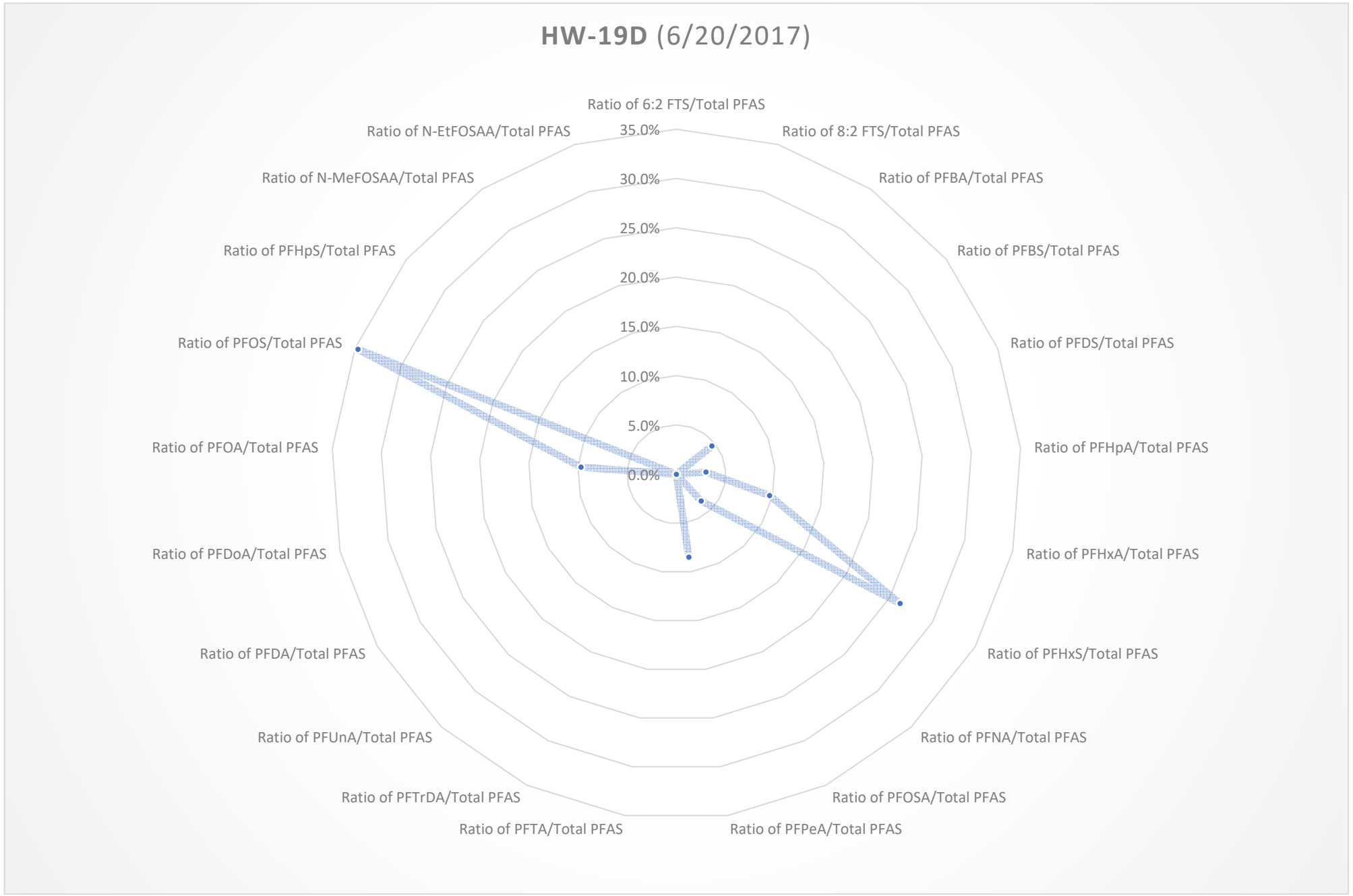
5.0%
0.0%


HW-19D (6/20/2017)
Ratio of 6:2 FTS/Total PFAS
Ratio of 8:2 FTS/Total PFAS
Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
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Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
35.0%
30.0%
25.0%
20.0%
15.0%
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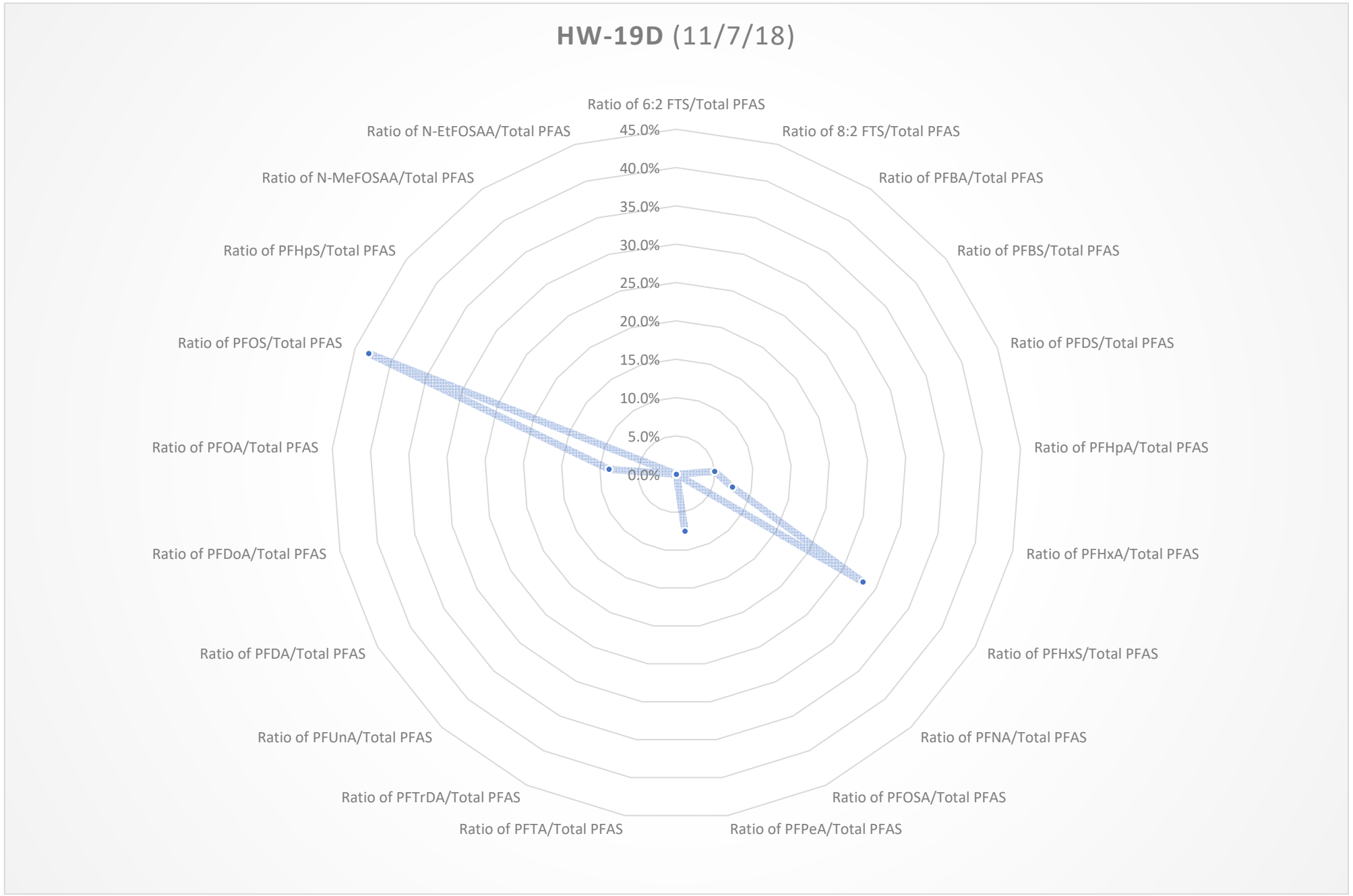
5.0%
0.0%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Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
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25.0%
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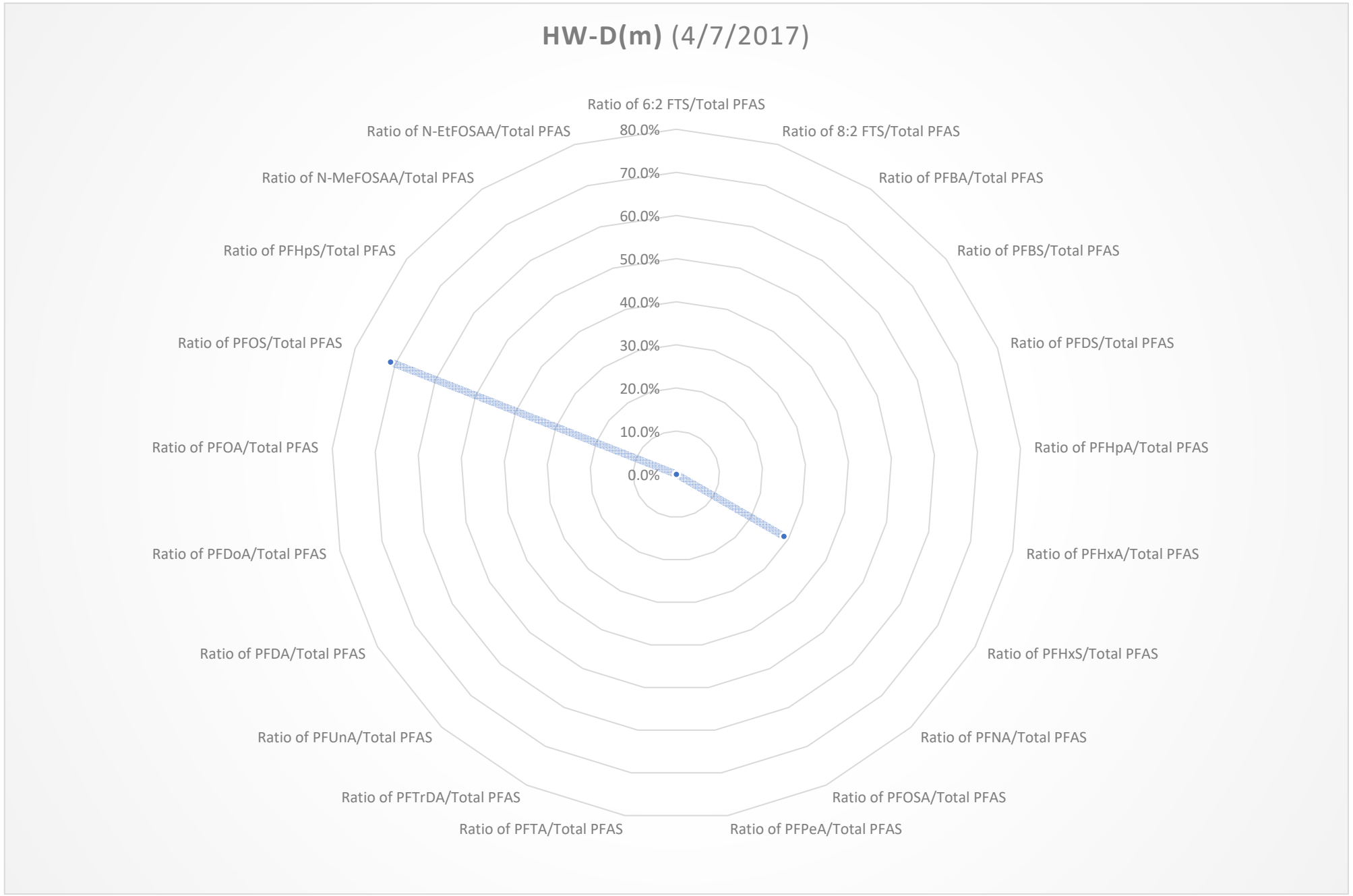
0.0%


HW-D(m) (4/7/2017)
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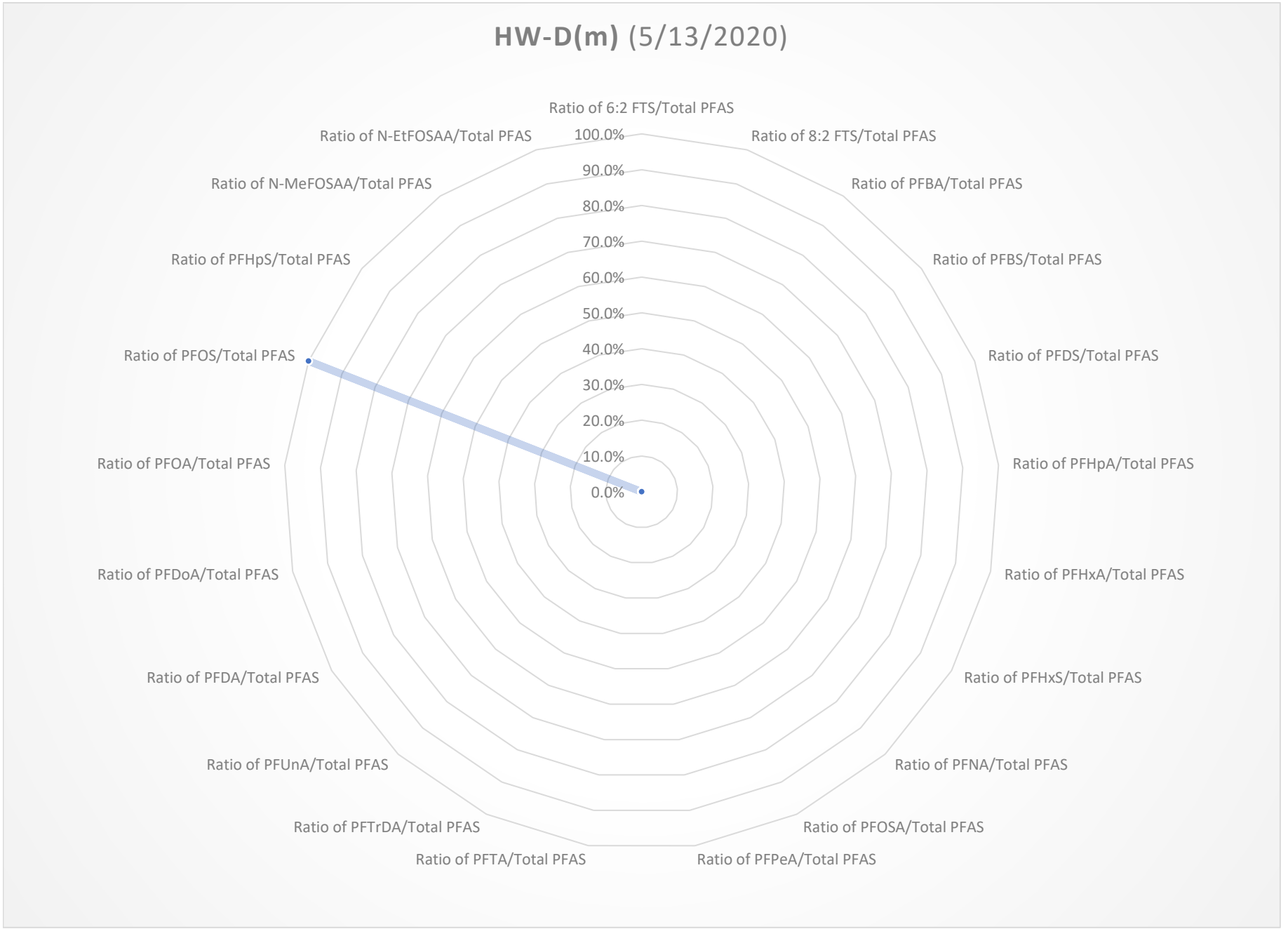
Ratio of 8:2 FTS/Total PFAS
Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
Ratio of PFDS/Total PFAS
Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
80.0%
70.0%
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%


HW-D(m) (5/13/2020)
Ratio of 6:2 FTS/Total PFAS
Ratio of 8:2 FTS/Total PFAS
Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
Ratio of PFDS/Total PFAS
Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
100.0%
90.0%
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70.0%
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50.0%
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30.0%
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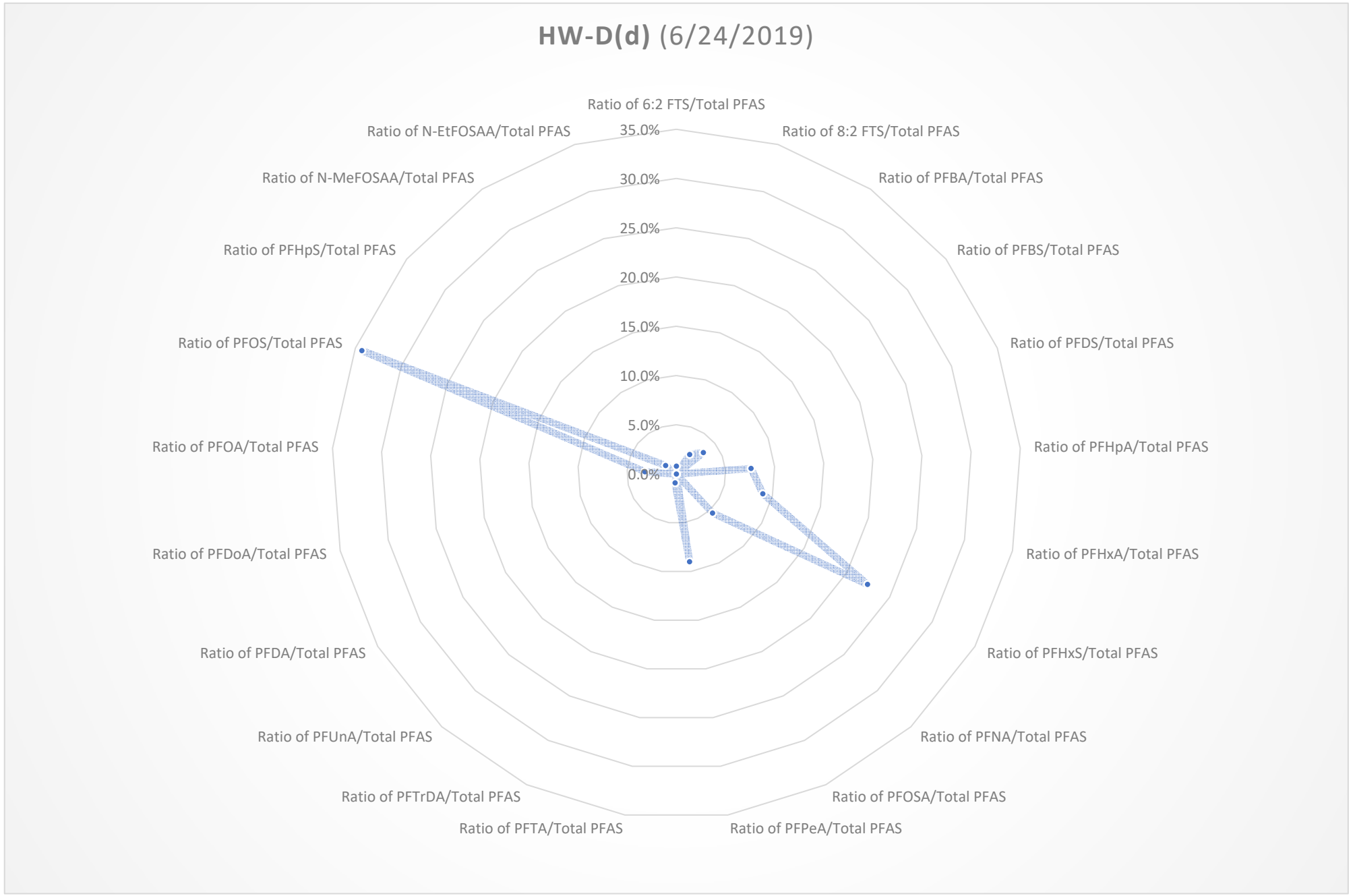
HW-D(d) (6/24/2019)
Ratio of 6:2 FTS/Total PFAS
Ratio of 8:2 FTS/Total PFAS
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Ratio of PFBS/Total PFAS
Ratio of PFDS/Total PFAS
Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
35.0%
30.0%
25.0%
20.0%
15.0%
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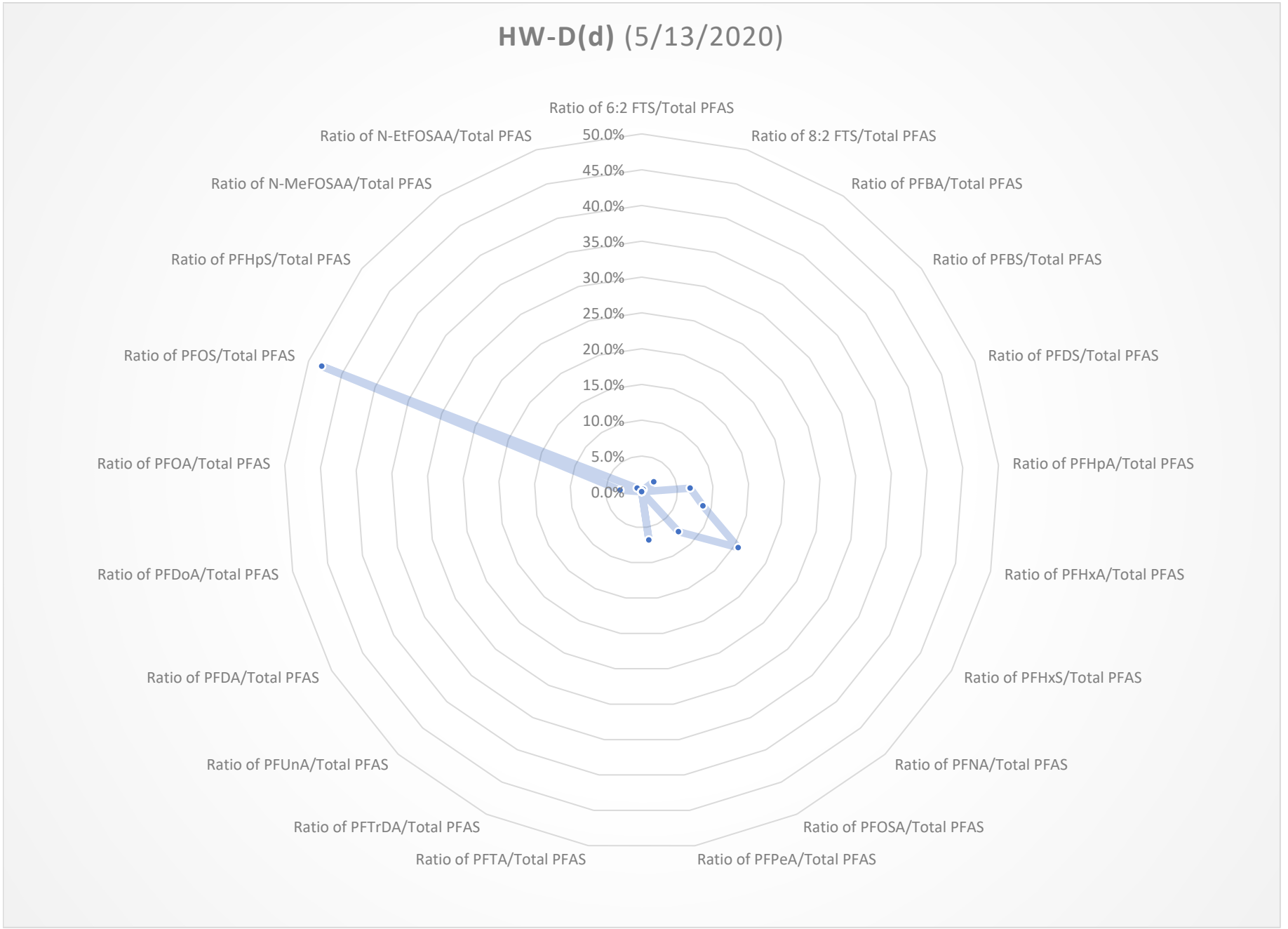
HW-D(d) (5/13/2020)
Ratio of 6:2 FTS/Total PFAS
Ratio of 8:2 FTS/Total PFAS
Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
Ratio of PFDS/Total PFAS
Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
50.0%
45.0%
40.0%
35.0%
30.0%
25.0%
20.0%
15.0%
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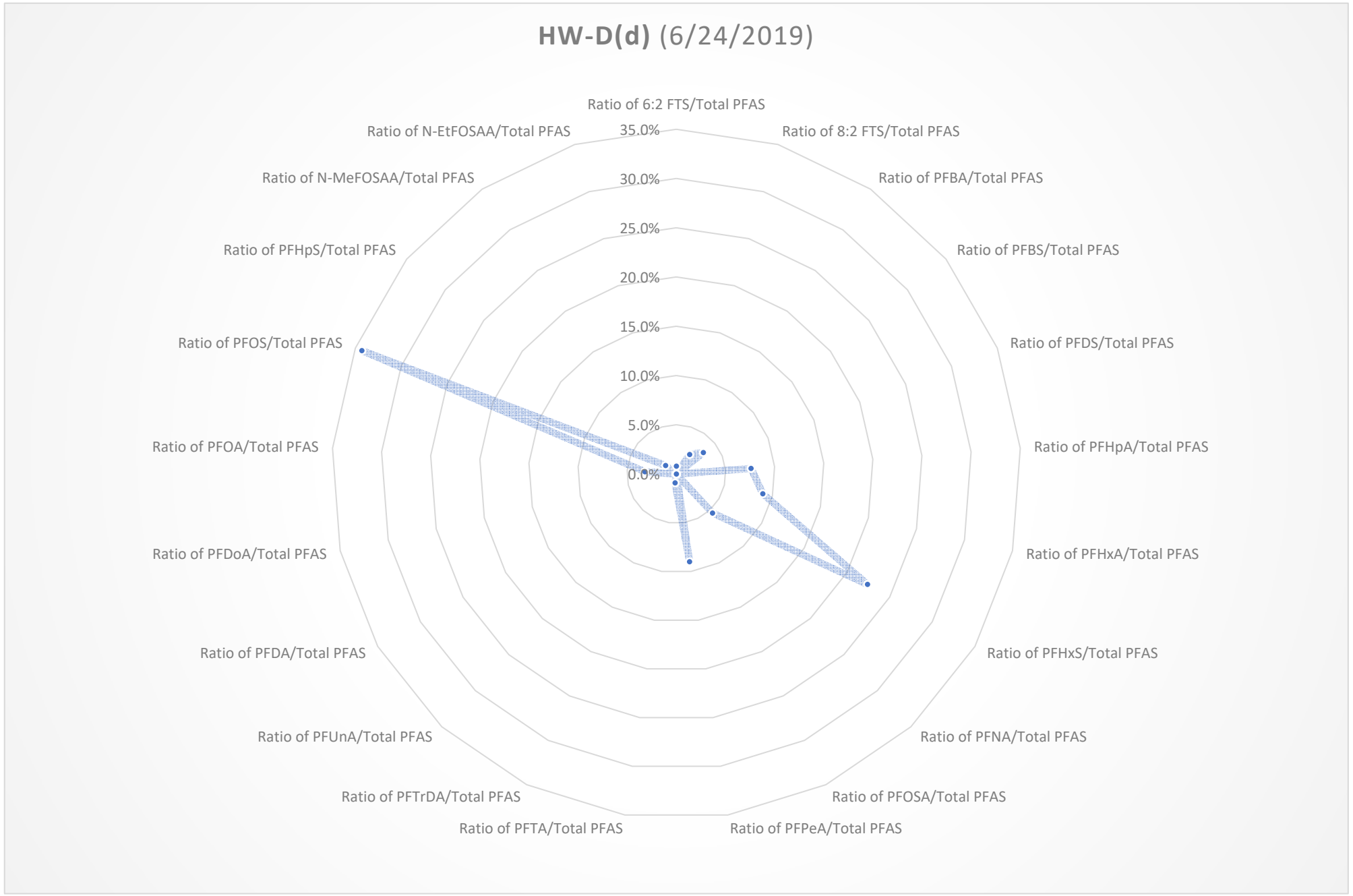
HW-D(d) (6/24/2019)
Ratio of 6:2 FTS/Total PFAS
Ratio of 8:2 FTS/Total PFAS
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Ratio of PFBS/Total PFAS
Ratio of PFDS/Total PFAS
Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
35.0%
30.0%
25.0%
20.0%
15.0%
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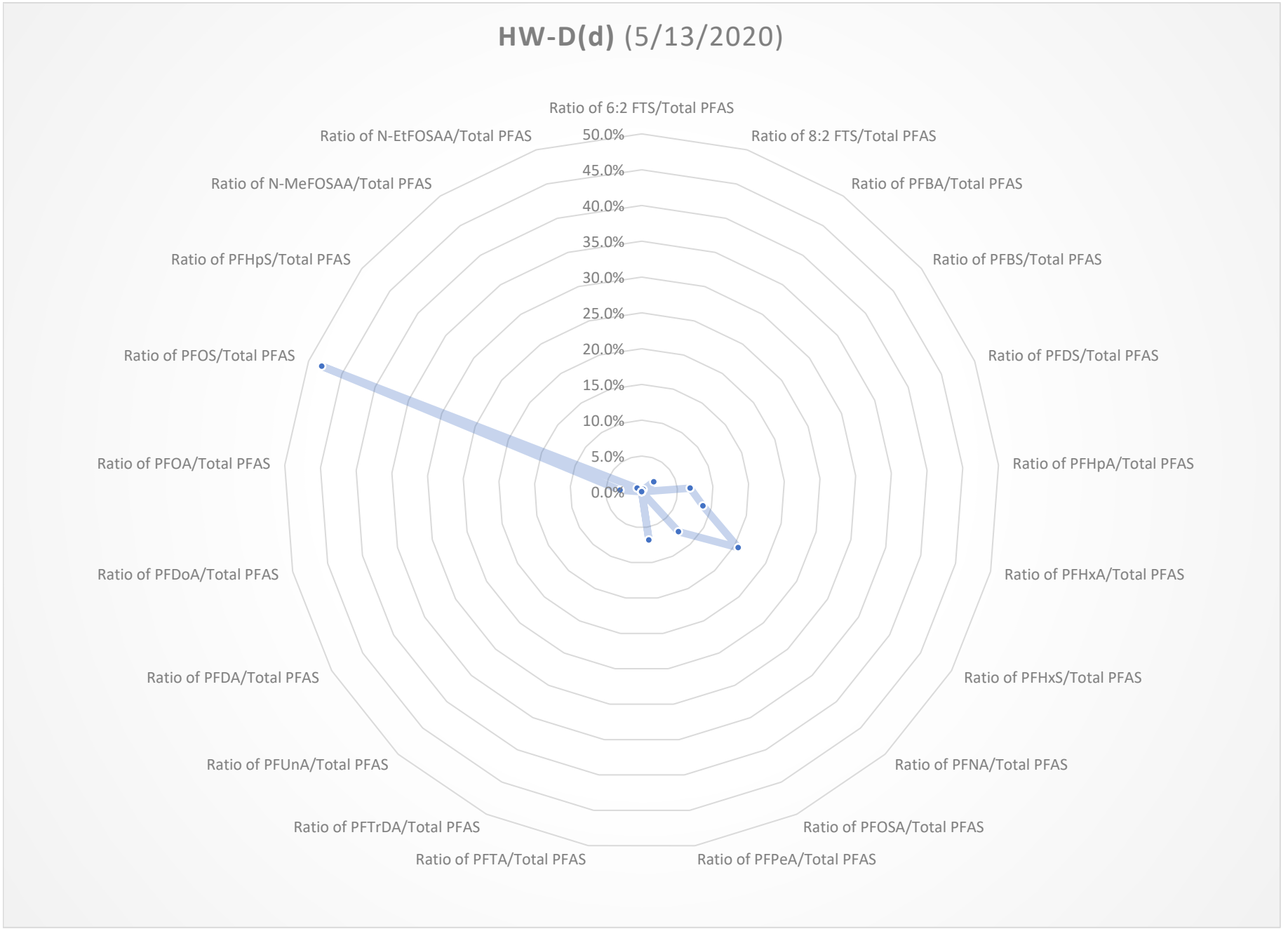
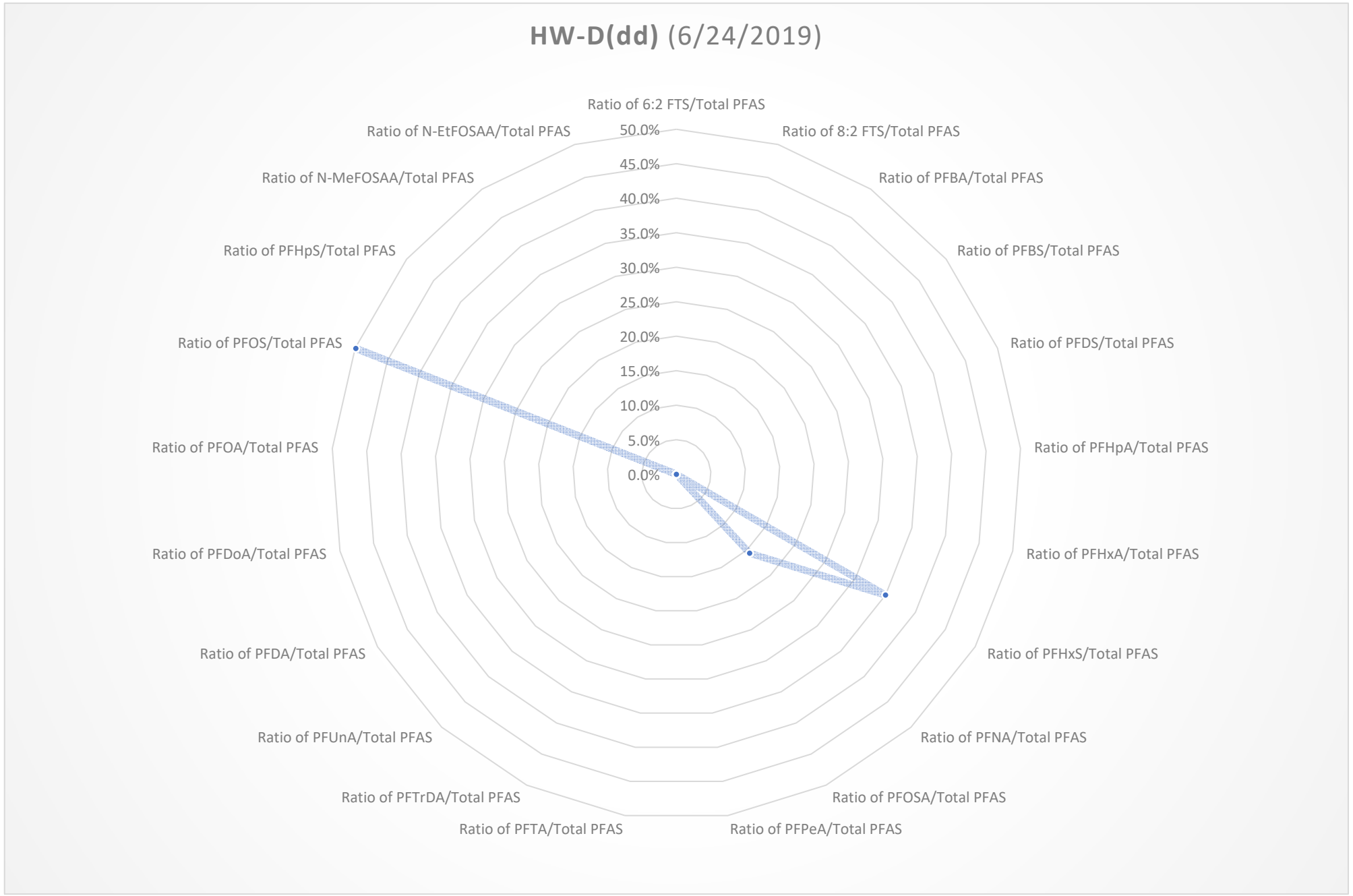

HW-D(d) (5/13/2020)
Ratio of 6:2 FTS/Total PFAS
Ratio of 8:2 FTS/Total PFAS
Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
Ratio of PFDS/Total PFAS
Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
50.0%
45.0%
40.0%
35.0%
30.0%
25.0%
20.0%
15.0%
10.0%
5.0%
0.0%


HW-D(dd) (6/24/2019)
Ratio of 6:2 FTS/Total PFAS
Ratio of 8:2 FTS/Total PFAS
Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
Ratio of PFDS/Total PFAS
Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
50.0%
45.0%
40.0%
35.0%
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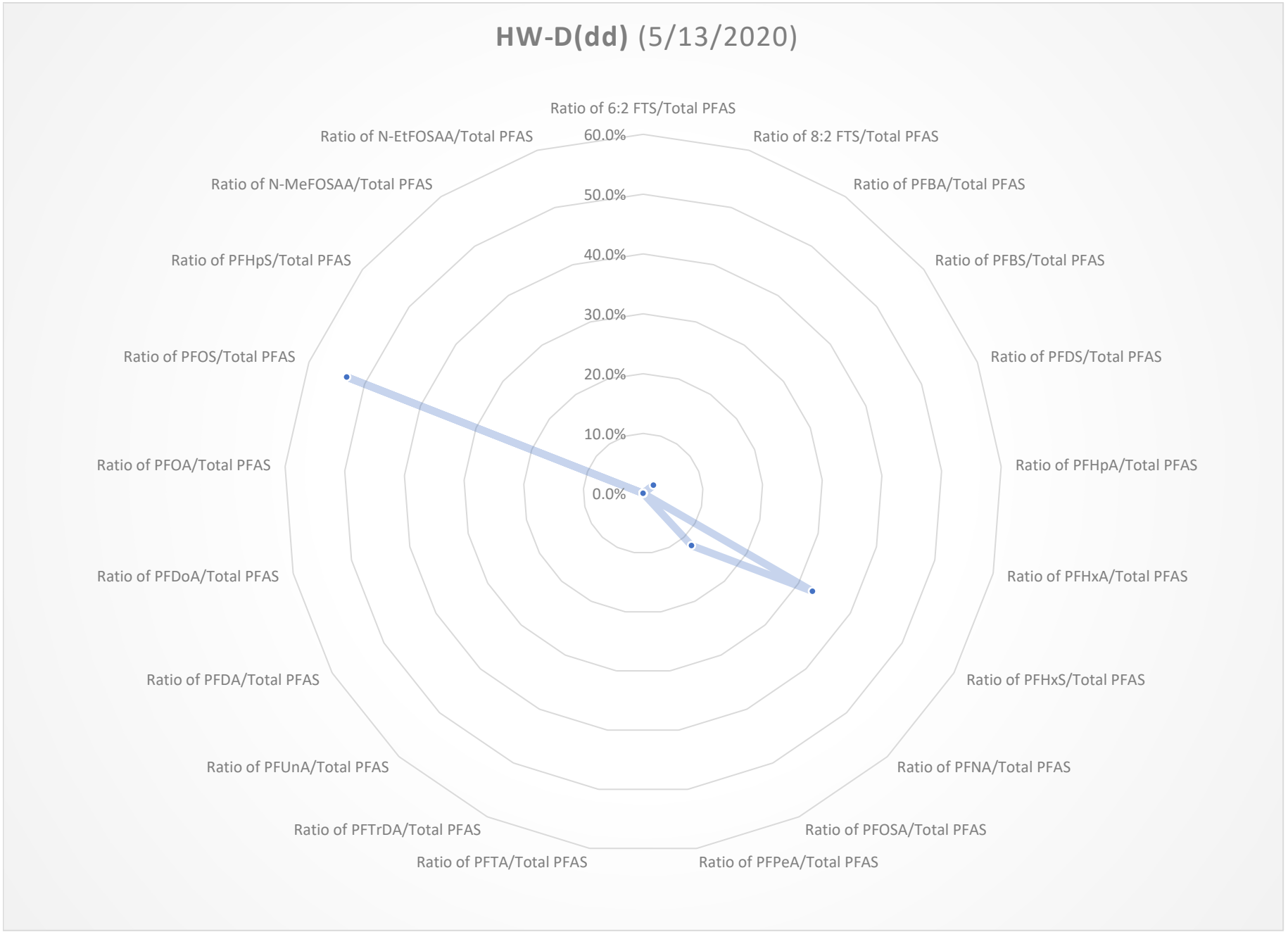
25.0%
20.0%
15.0%
10.0%
5.0%
0.0%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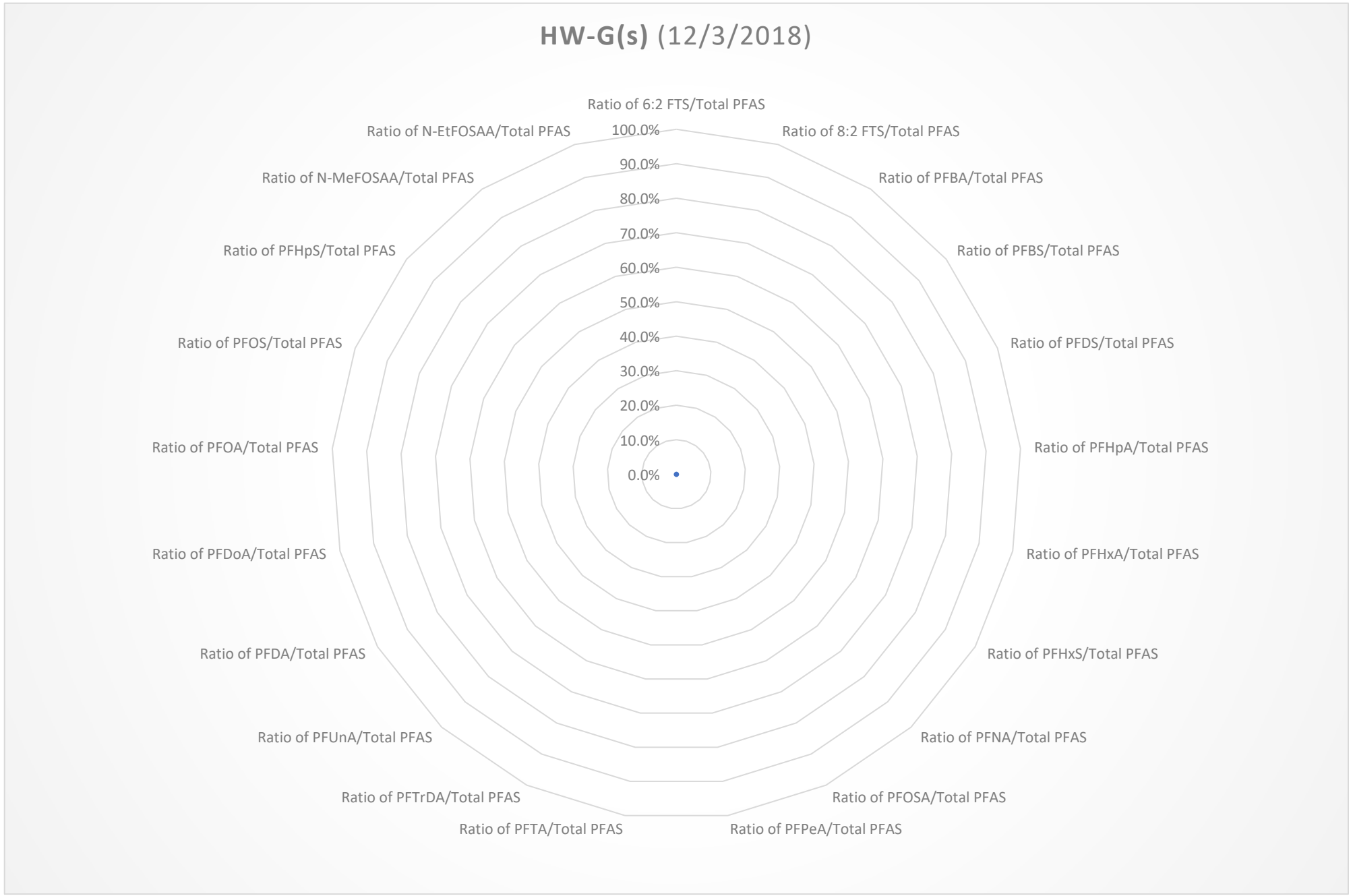
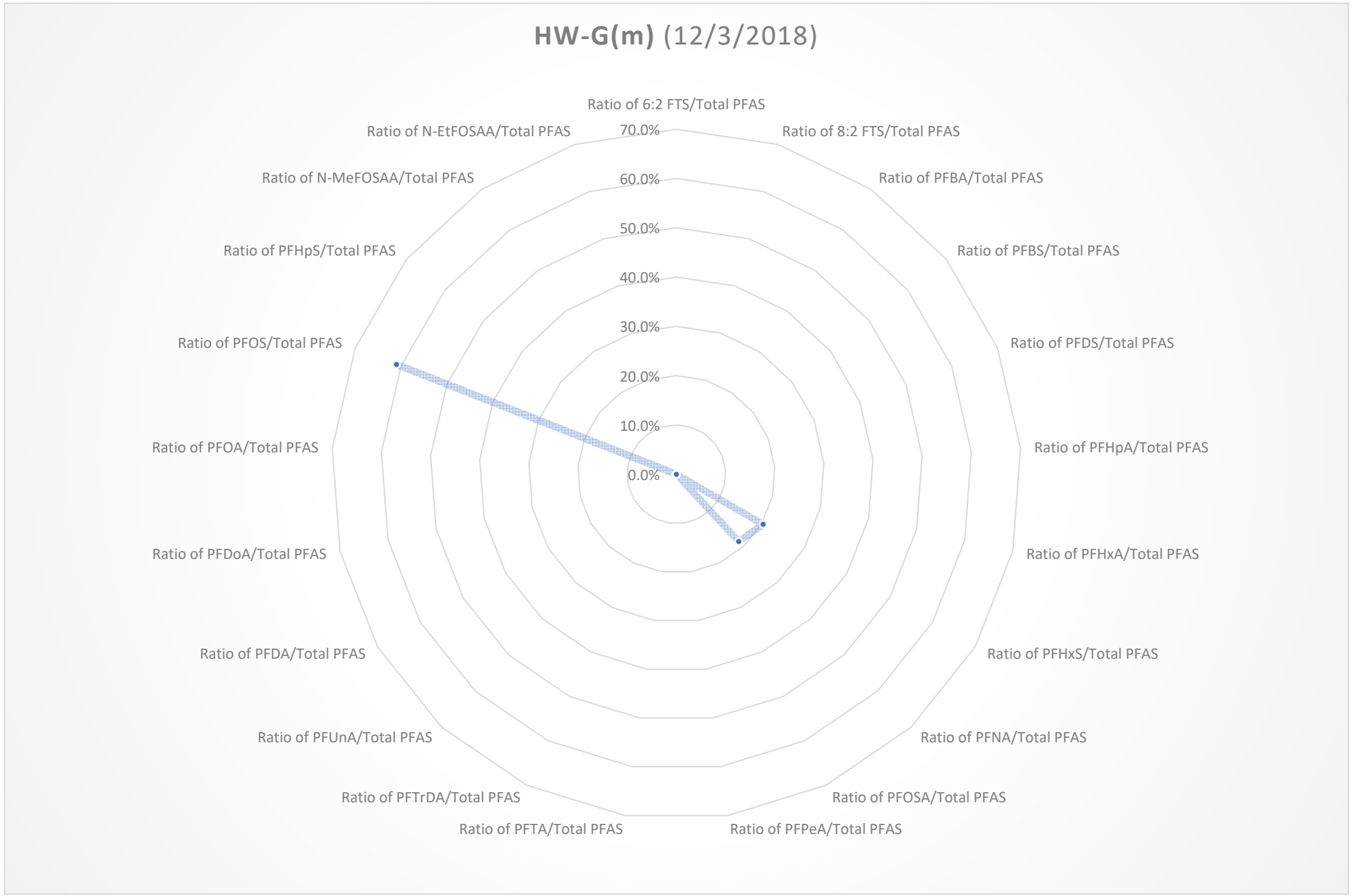
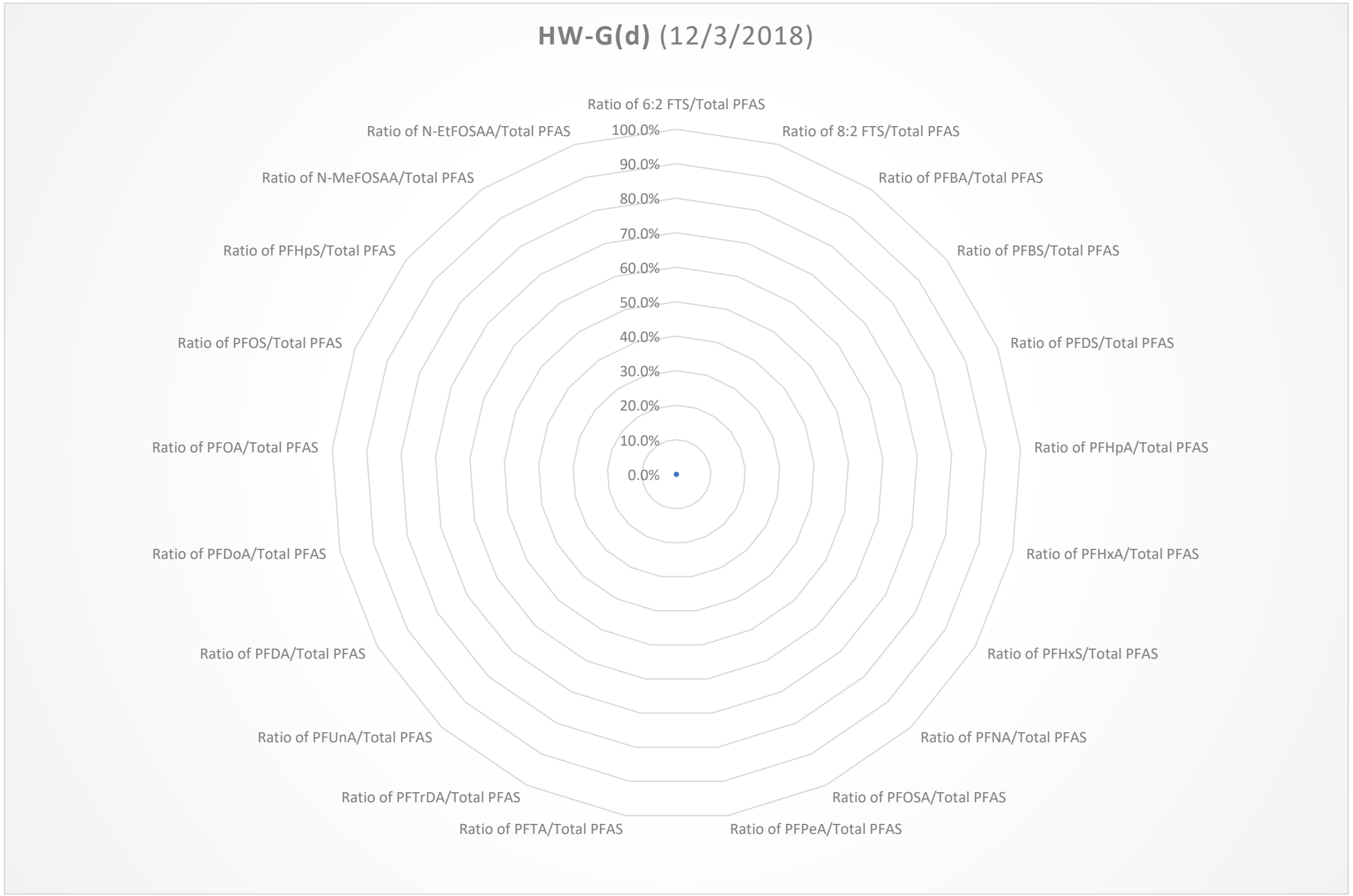
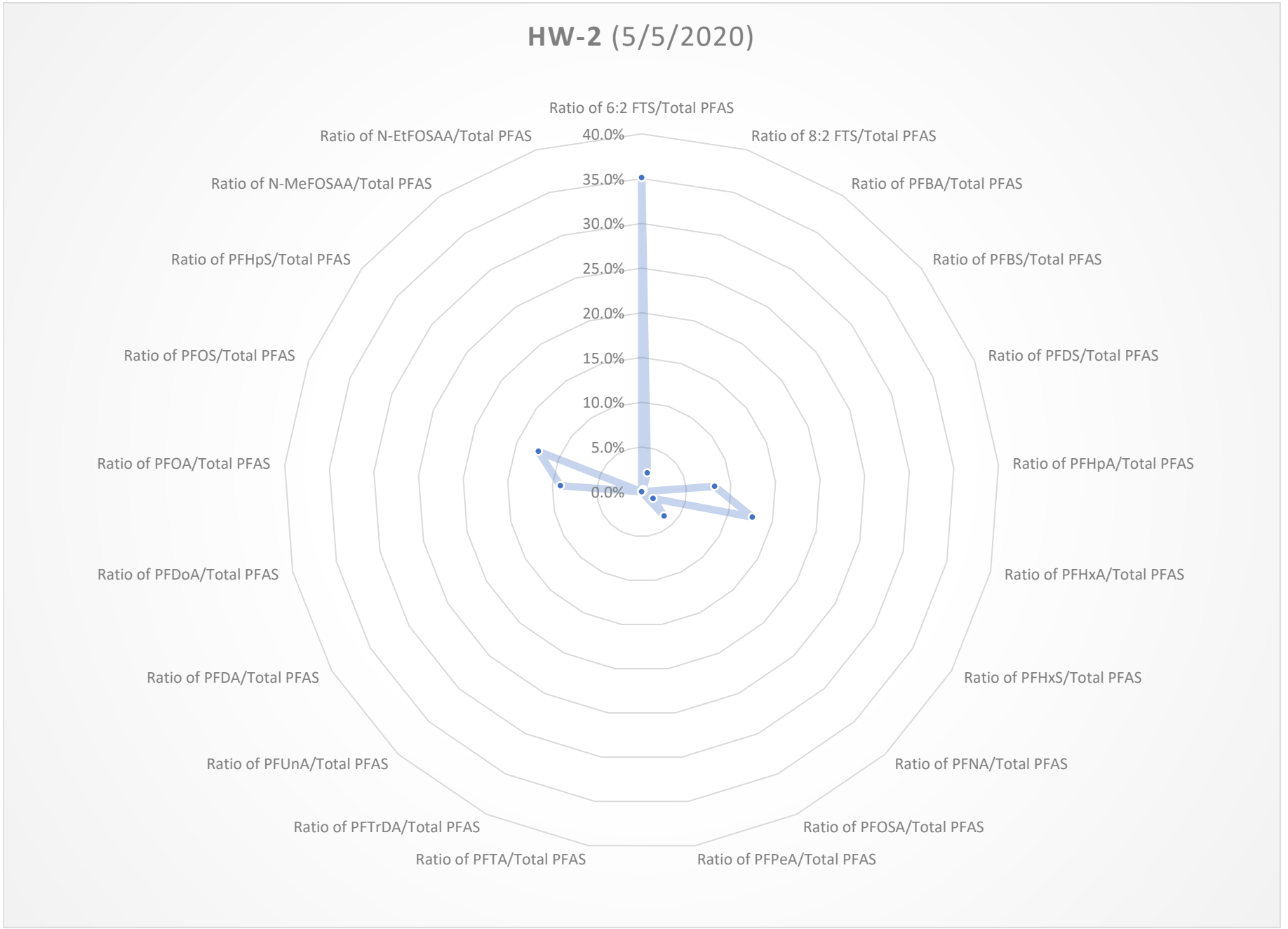
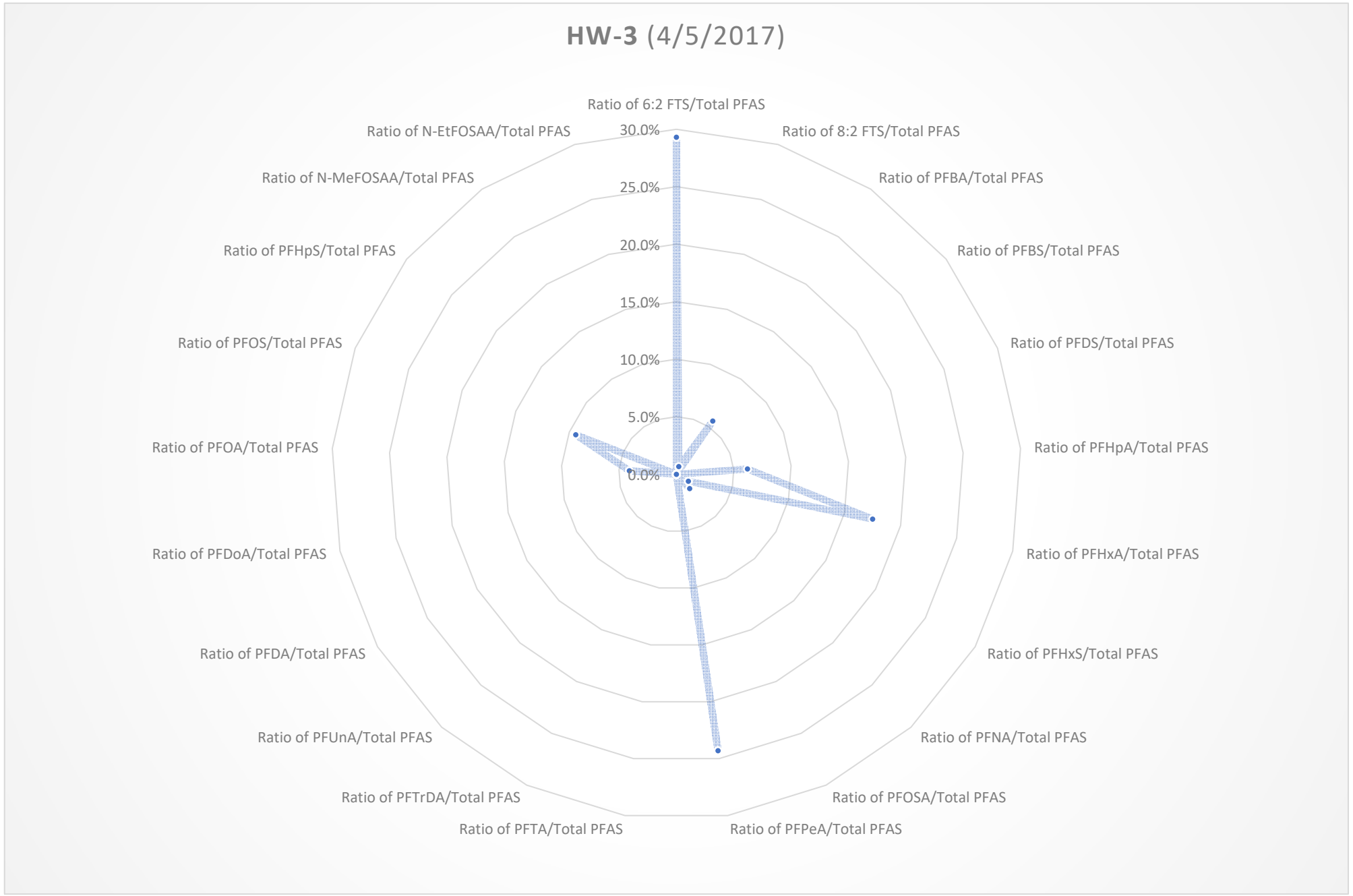
Ratio of 8:2 FTS/Total PFAS
Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
Ratio of PFDS/Total PFAS
Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%

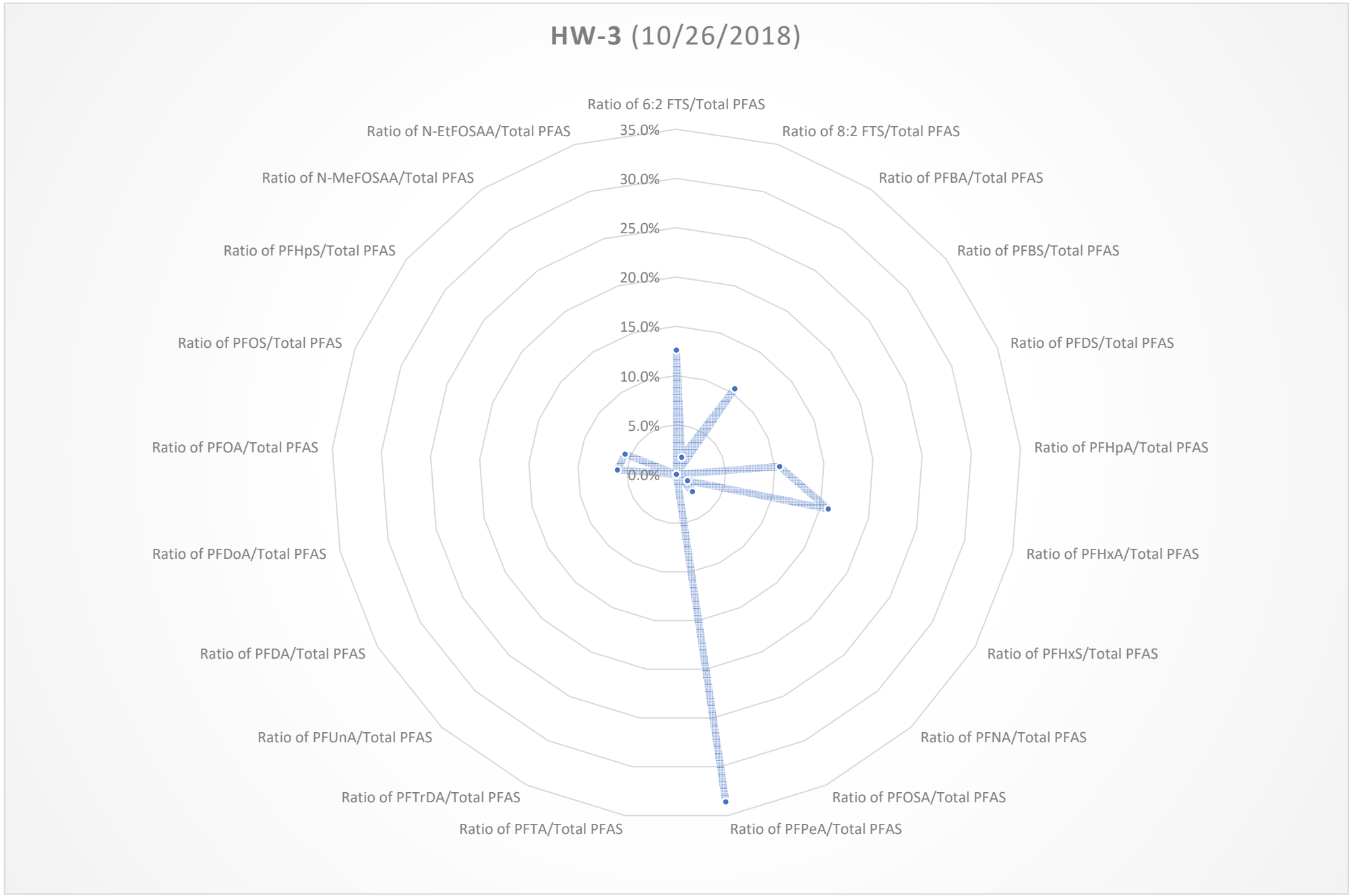

HW-G(s) (12/3/2018)
Ratio of 6:2 FTS/Total PFAS
Ratio of 8:2 FTS/Total PFAS
Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
Ratio of PFDS/Total PFAS
Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
100.0%
90.0%
80.0%
70.0%
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%


HW-G(m) (12/3/2018)
Ratio of 6:2 FTS/Total PFAS
Ratio of 8:2 FTS/Total PFAS
Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
Ratio of PFDS/Total PFAS
Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
70.0%
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%


HW-G(d) (12/3/2018)
Ratio of 6:2 FTS/Total PFAS
Ratio of 8:2 FTS/Total PFAS
Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
Ratio of PFDS/Total PFAS
Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
100.0%
90.0%
80.0%
70.0%
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%


HW-2 (5/5/2020)
Ratio of 6:2 FTS/Total PFAS
Ratio of 8:2 FTS/Total PFAS
Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
Ratio of PFDS/Total PFAS
Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
40.0%
35.0%
30.0%
25.0%
20.0%
15.0%
10.0%
5.0%
0.0%


HW-3 (4/5/2017)
Ratio of 6:2 FTS/Total PFAS
Ratio of 8:2 FTS/Total PFAS
Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
Ratio of PFDS/Total PFAS
Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
30.0%
25.0%
20.0%
15.0%
10.0%
5.0%
0.0%


HW-3 (10/26/2018)
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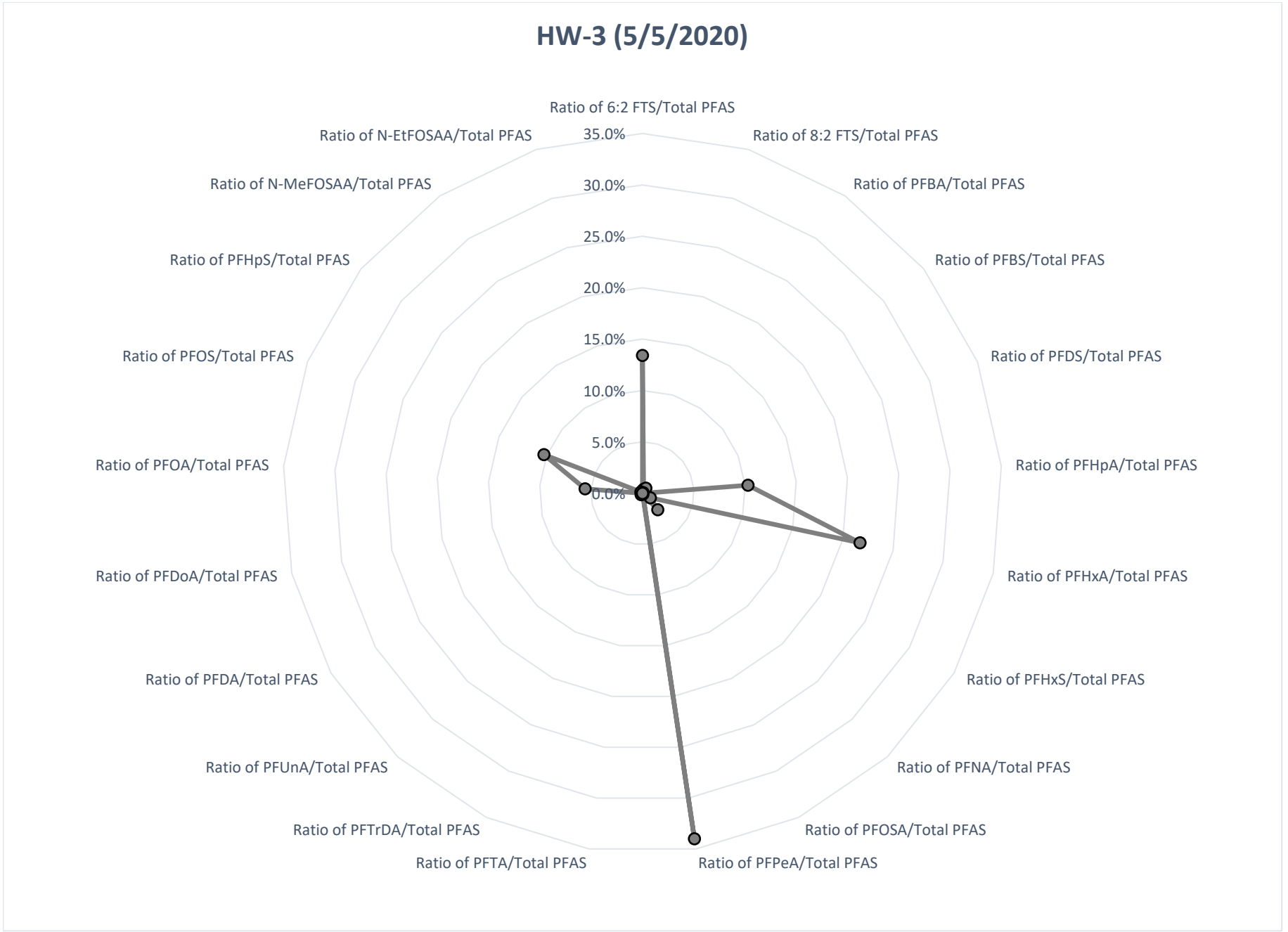
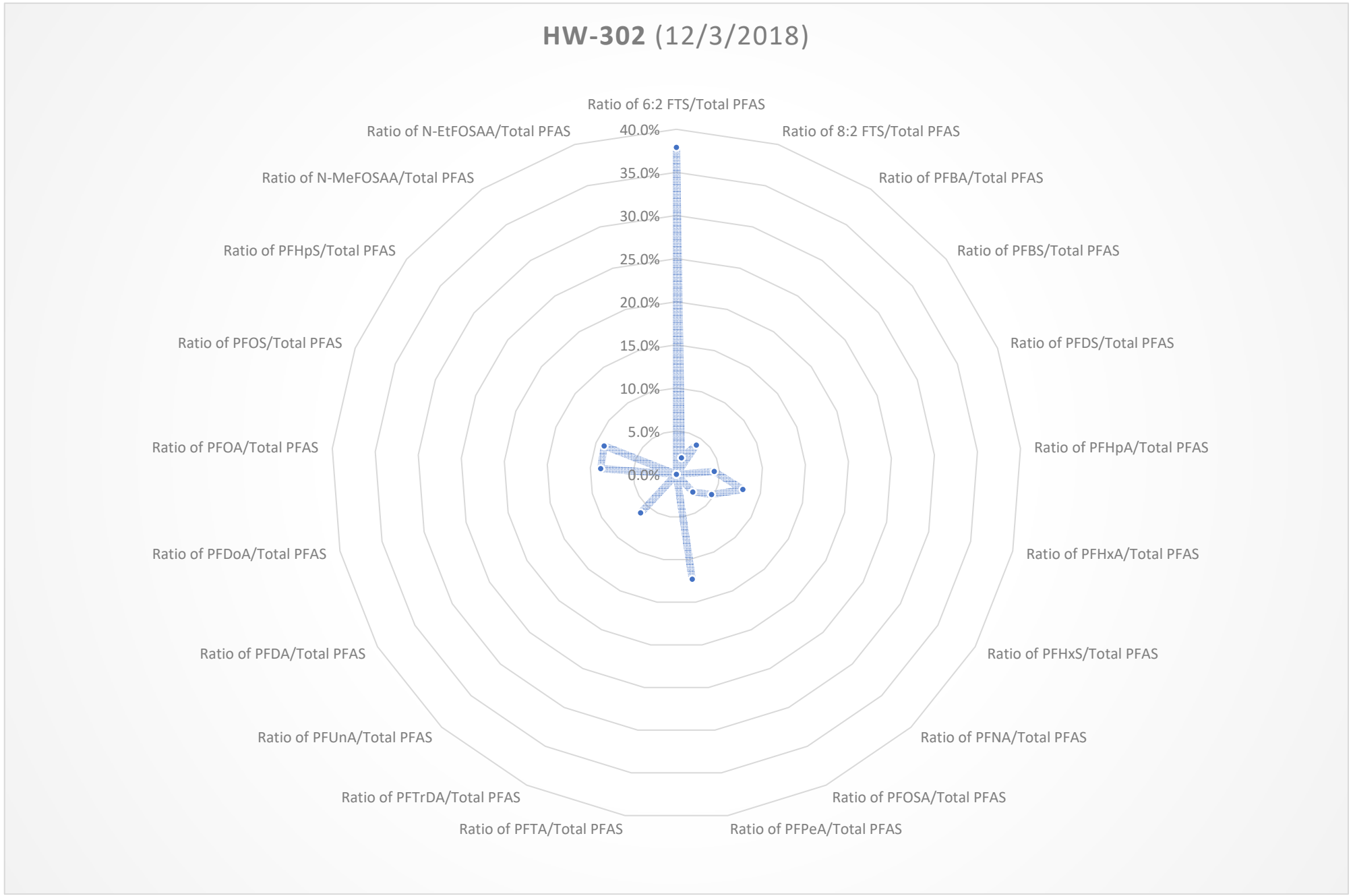
Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
Ratio of PFDS/Total PFAS
Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
35.0%
30.0%
25.0%
20.0%
15.0%
10.0%
5.0%
0.0%


HW-3 (5/5/2020)
Ratio of 6:2 FTS/Total PFAS
Ratio of 8:2 FTS/Total PFAS
Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
Ratio of PFDS/Total PFAS
Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
35.0%
30.0%
25.0%
20.0%
15.0%
10.0%
5.0%
0.0%


HW-302 (12/3/2018)
Ratio of 6:2 FTS/Total PFAS
Ratio of 8:2 FTS/Total PFAS
Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
Ratio of PFDS/Total PFAS
Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
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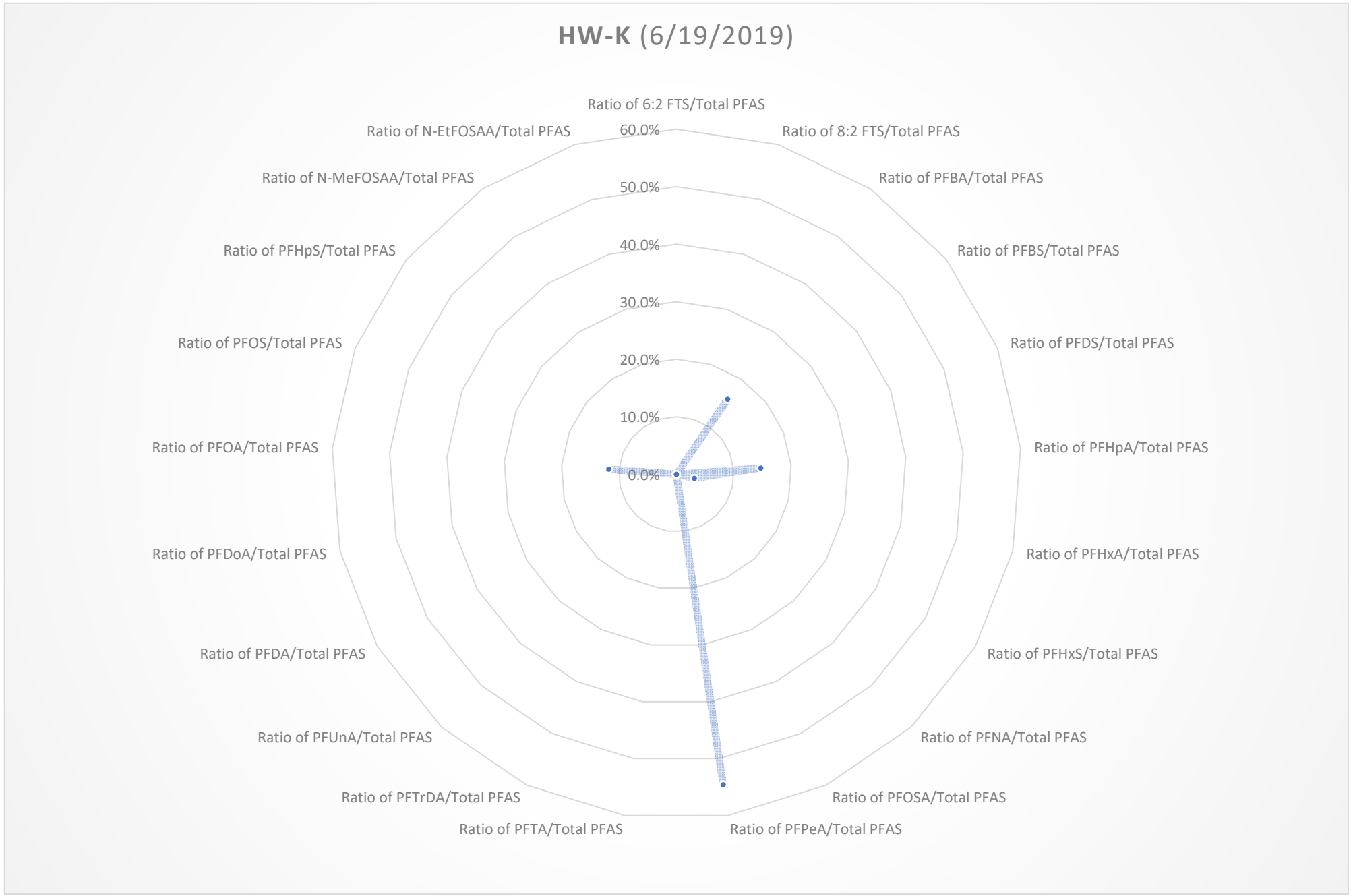
35.0%
30.0%
25.0%
20.0%
15.0%
10.0%
5.0%
0.0%


HW-K (6/19/2019)
Ratio of 6:2 FTS/Total PFAS
Ratio of 8:2 FTS/Total PFAS
Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
Ratio of PFDS/Total PFAS
Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
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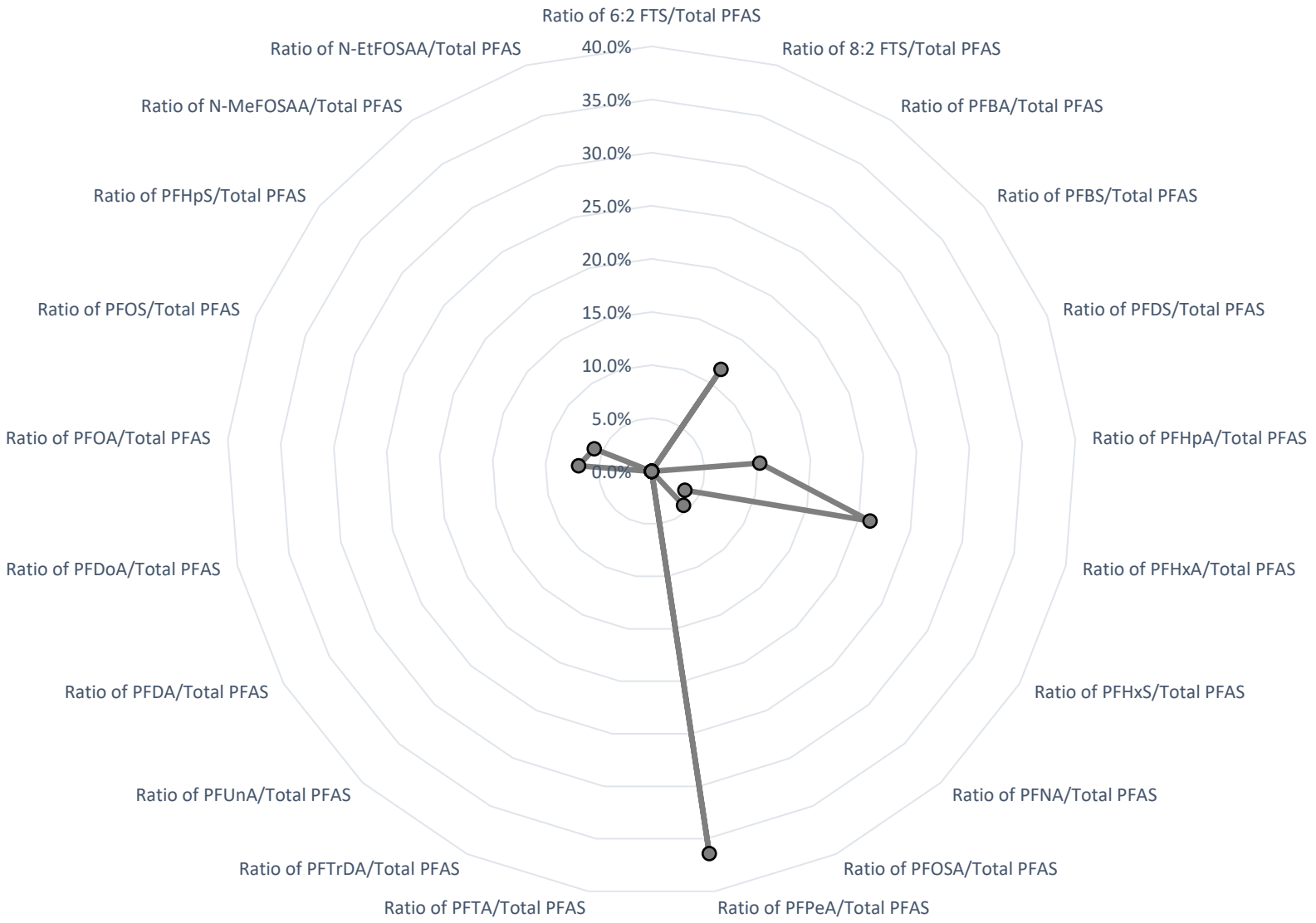
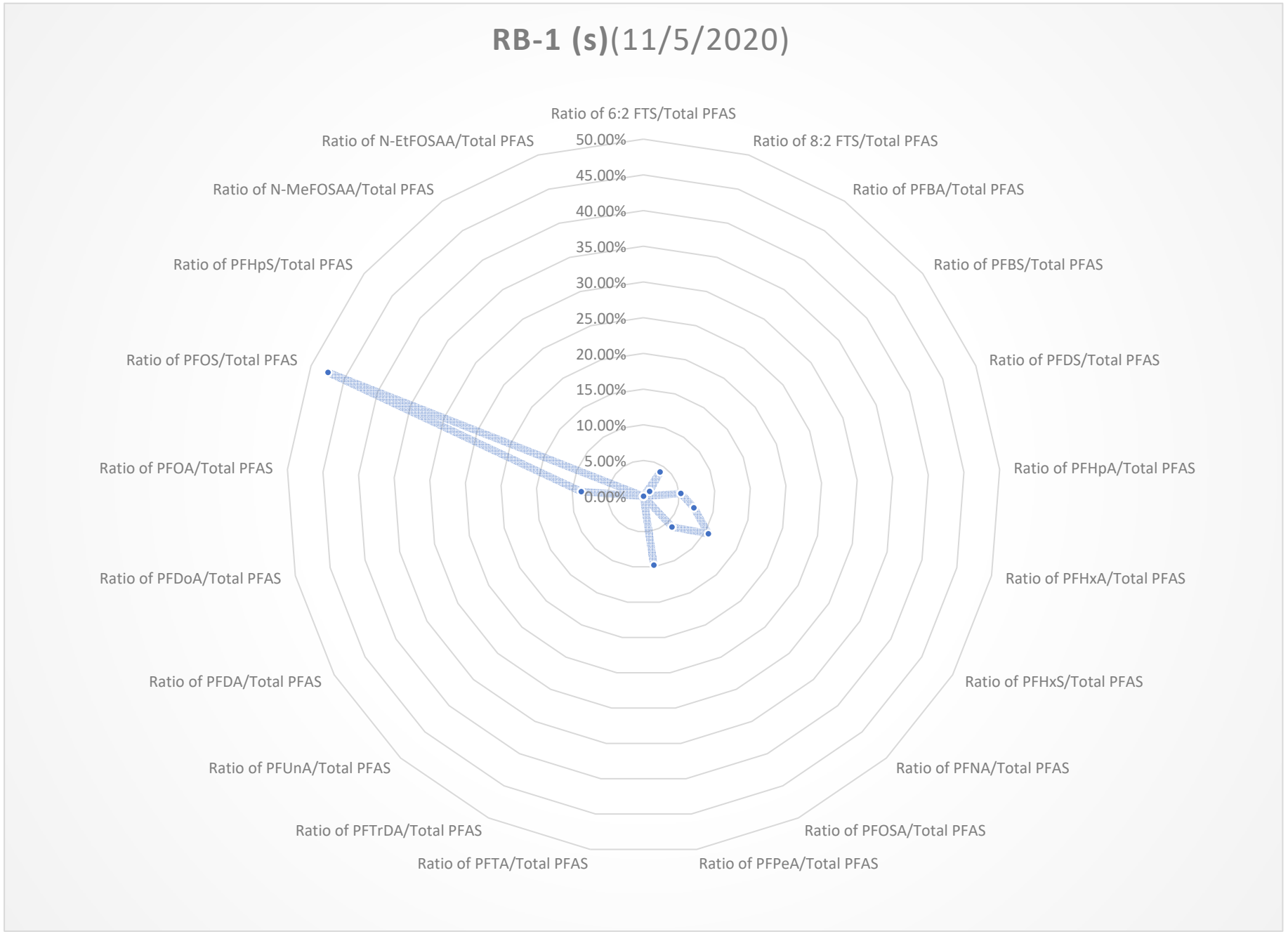
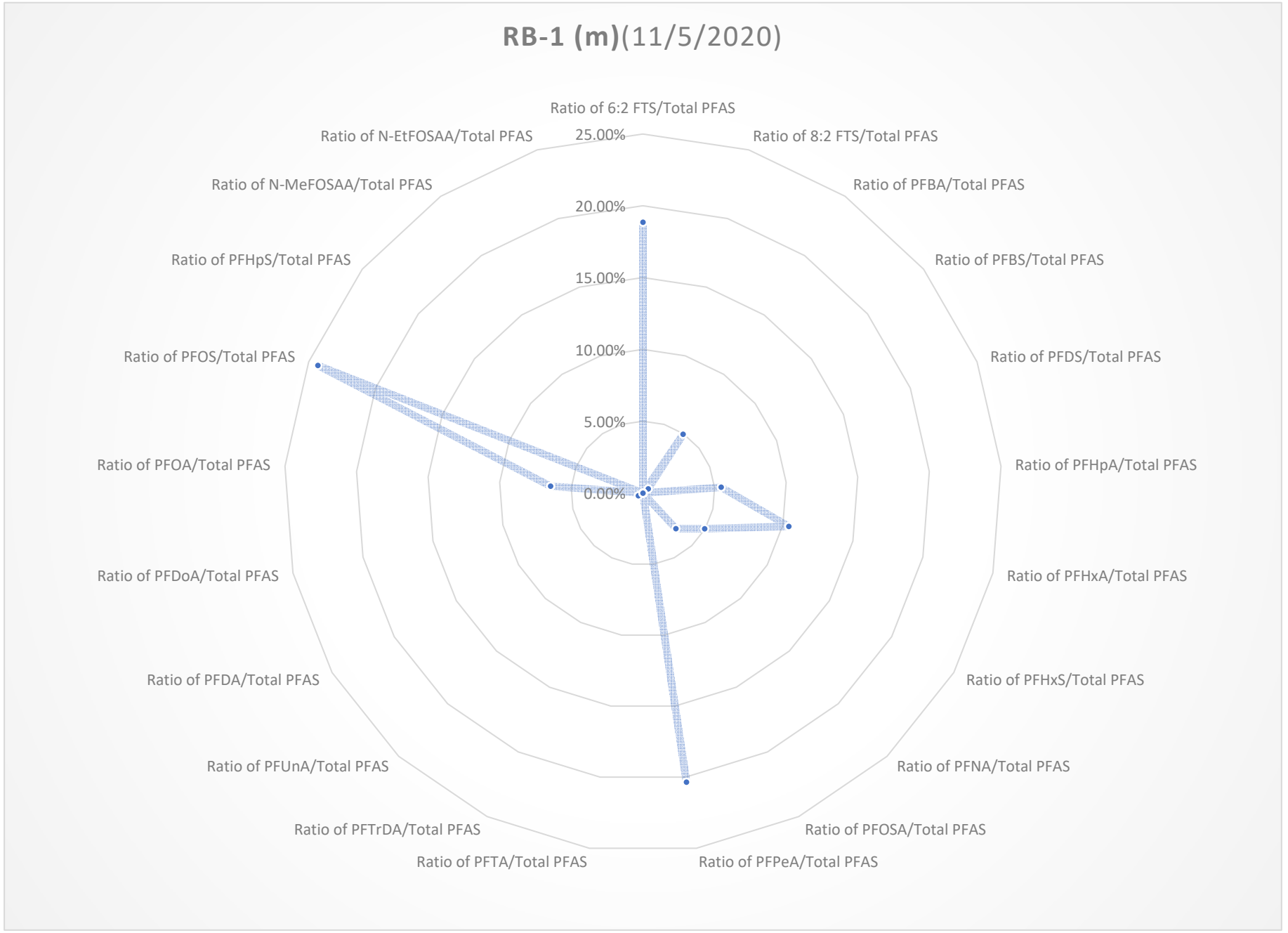
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%

HW-K (5/21/2020)


Ratio of 6:2 FTS/Total PFAS
Ratio of 8:2 FTS/Total PFAS
Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
Ratio of PFDS/Total PFAS
Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
40.0%
35.0%
30.0%
25.0%
20.0%
15.0%
10.0%
5.0%
0.0%


RB-1 (s)(11/5/2020)
Ratio of 6:2 FTS/Total PFAS
Ratio of 8:2 FTS/Total PFAS
Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
Ratio of PFDS/Total PFAS
Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
50.00%
45.00%
40.00%
35.00%
30.00%
25.00%
20.00%
15.00%
10.00%
5.00%
0.00%


RB-1 (m)(11/5/2020)
Ratio of 6:2 FTS/Total PFAS
Ratio of 8:2 FTS/Total PFAS
Ratio of PFBA/Total PFAS
Ratio of PFBS/Total PFAS
Ratio of PFDS/Total PFAS
Ratio of PFHpA/Total PFAS
Ratio of PFHxA/Total PFAS
Ratio of PFHxS/Total PFAS
Ratio of PFNA/Total PFAS
Ratio of PFOSA/Total PFAS
Ratio of PFPeA/Total PFAS
Ratio of PFTA/Total PFAS
Ratio of PFTrDA/Total PFAS
Ratio of PFUnA/Total PFAS
Ratio of PFDA/Total PFAS
Ratio of PFDoA/Total PFAS
Ratio of PFOA/Total PFAS
Ratio of PFOS/Total PFAS
Ratio of PFHpS/Total PFAS
Ratio of N-MeFOSAA/Total PFAS
Ratio of N-EtFOSAA/Total PFAS
25.00%
20.00%
15.00%
10.00%
5.00%
0.00%

APPENDIX B

SOIL BORING/MONITORING WELL LOGS

Cape Cod Test Boring	Project	Boring No. ARFF - 3
5 Rayber Road, Orleans, MA 02653	Horsley Witten Group	
(508) 240-1000	Barnstable, 480 Barnstable Road	Sheet 1 of 1
div. Desmond Well Drilling, Inc.	Hyannis, MA	

Driller: Tommy Desmond	Boring location:
Helper: Sean Morgan	Ground Surface Elevation:
Inspector: Josephine Ibanez	Date start: 10/9/2018 Date end: 10/9/2018

Direct push sampler consists of 4' x 2 3/8" G3 dual tube direct push steel tooling with 4' x 1 1/2" PVC liner with 201 ft lb hydraulic hammer (percussion rate 2200 bpm)	Direct push steel tooling: 2 3/8" G3 dual tube

Depth	Sample				Sample Description
(FT)	NO	PEN/REC	DEPTH/FT	BLOWS 6"	
+2					
0	1	N/R	0 - 4	N/R	Loamy; F-M-C brown sand and F gravel. Dry.
2					
4	2		4 - 8		F-M-C brown sand and F-M gravel. Dry.
6					
8	3		8 - 12		F-M-C brown sand. Dry.
10					
12					
14					
16					
18					
20					
22					
24					
26					
28					
30					
32					
34					
36					
38					
40					
42					
44					
46					
48					
50					
52					
54					
56					
58					
60					End of probe: 12'
62					End of sample: 12'
64					
66					

Granular Soils		Cohesive Soils		Proportions Used
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0 - 4	V. LOOSE	> 2	V. SOFT	Trace 0 - 10%
4 - 10	LOOSE	2 - 4	SOFT	Little 10 - 20%
10 - 30	M. DENSE	4 - 8	M. STIFF	Some 20 - 35%
30 - 50	DENSE	8 - 15	STIFF	And 35 - 50%
> 50	V. DENSE	15 - 30	V. STIFF	
		> 30	HARD	

Well Installation Key
- CONCRETE
- SAND PACK
- Z - SOIL BACKFILL
- BENTONITE
- SCREEN
- APPROX. WATER LEVEL

CAPE COD TEST BORING **BORING NO. ARFF - 3**

Cape Cod Test Boring	Project	Boring No. DL - 11
5 Rayber Road, Orleans, MA 02653	Horsley Witten Group	
(508) 240-1000	Barnstable, 480 Barnstable Road	Sheet 1 of 1
div. Desmond Well Drilling, Inc.	Hyannis, MA	

Driller: Tommy Desmond	Boring location:
Helper: Sean Morgan	Ground Surface Elevation:
Inspector: Josephine Ibanez	Date start: 10/3/2018 Date end: 10/3/2018

Direct push sampler consists of 4' x 2 3/8" G3 dual tube direct push steel tooling with 4' x 1 1/2" PVC liner with 201 ft lb hydraulic hammer (percussion rate 2200 bpm)	Direct push steel tooling: 2 3/8" G3 dual tube

Depth	Sample				Sample Description
(FT)	NO	PEN/REC	DEPTH/FT	BLOWS 6"	
	1	24/18	4 - 6		F-M-C brown sand; trace of cobble. Dry.
					Switched to Probe
0	1	N/R	0 - 4	N/R	Loamy material; F-M-C brown sand; trace F-M gravel. Dry.
2					
4	2		4 - 8		F-M-C brown sand; trace F-M gravel. Dry.
6					
8	3		8 - 12		F-M-C brown sand; trace very C brown sand. Dry.
10					
12	4		12 - 16		F-M-C brown sand; trace very C brown sand. Dry.
14					
16					
18					
20					
22					
24					
26					
28					
30					
32					
34					
36					
38					
40					
42					
44					
46					
48					
50					
52					
54					
56					End of probe: 16'
58					End of sample: 16'
60					
62					

Granular Soils		Cohesive Soils		Proportions Used
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0 - 4	V. LOOSE	> 2	V. SOFT	Trace 0 - 10%
4 - 10	LOOSE	2 - 4	SOFT	Little 10 - 20%
10 - 30	M. DENSE	4 - 8	M. STIFF	Some 20 - 35%
30 - 50	DENSE	8 - 15	STIFF	And 35 - 50%
> 50	V. DENSE	15 - 30	V. STIFF	
		> 30	HARD	

Well Installation Key
- CONCRETE
- SAND PACK
- Z - SOIL BACKFILL
- BENTONITE
- SCREEN
- APPROX. WATER LEVEL

CAPE COD TEST BORING **BORING NO. DL - 11**

Cape Cod Test Boring	Project	Boring No. DL - 14
5 Rayber Road, Orleans, MA 02653	Horsley Witten Group	
(508) 240-1000	Barnstable, 480 Barnstable Road	Sheet 1 of 1
div. Desmond Well Drilling, Inc.	Hyannis, MA	

Driller: Tommy Desmond	Boring location:
Helper: Sean Morgan	Ground Surface Elevation:
Inspector: Josephine Ibanez	Date start: Date end:

Direct push sampler consists of 4' x 2 3/8" G3 dual tube direct push steel tooling with 4' x 1 1/2" PVC liner with 201 ft lb hydraulic hammer (percussion rate 2200 bpm)	Direct push steel tooling: 2 3/8" G3 dual tube

Depth	Sample				Sample Description
(FT)	NO	PEN/REC	DEPTH/FT	BLOWS 6"	
+2					
0	1	N/R	0 - 4	N/R	Subsurface road material. Loamy; silty sand; F-M-C brown sand;
2					trace F gravel. Dry.
4	2		4 - 8		F-M-C brown sand; some F-M gravel. Dry.
6					
8	3		8 - 12		F-M-C brown sand; trace F gravel. Dry.
10					
12	4		12 - 16		F-M-C brown sand. Dry.
14					
16					
18					
20					
22					
24					
26					
28					
30					
32					
34					
36					
38					
40					
42					
44					
46					
48					
50					
52					
54					
56					
58					
60					End of probe: 16'
62					End of sample: 16'
64					
66					

Granular Soils		Cohesive Soils		Proportions Used
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0 - 4	V. LOOSE	> 2	V. SOFT	Trace 0 - 10%
4 - 10	LOOSE	2 - 4	SOFT	Little 10 - 20%
10 - 30	M. DENSE	4 - 8	M. STIFF	Some 20 - 35%
30 - 50	DENSE	8 - 15	STIFF	And 35 - 50%
> 50	V. DENSE	15 - 30	V. STIFF	
		> 30	HARD	

Well Installation Key

- CONCRETE
- SAND PACK
- Z - SOIL BACKFILL
- BENTONITE
- SCREEN
- APPROX. WATER LEVEL

CAPE COD TEST BORING **BORING NO. DL - 14**

BORING LOG

Boring No. HW-1
Sheet 1 of 1

Project: Barnstable Air Hangar
Client: Barnstable Municipal Airport
Boring Contractor: Desmond Well Drilling, Inc.
Boring Equipment: Hollow Stem Auger
Ground Water: Date: 31-Aug-95 Depth, ft.: 23 below land surface

Date: 31 August 1995
Completion Depth: 31 feet Below Land Surface
Elevation: N/A
Inspector: Howard Frank

Depth Feet	Description	Sample Number	Penetra./ Recovery	Blow Count	Comments	Well Details	Depth Feet
0					Locking Road Box		0
2					Cement Seal		2
4							4
6	M-C Br sand, rock frags-pebbles in tip to 4"	HW-1.1	13"	9-23-13-12	Natural Backfill		6
8							8
10	VC Br sand and gravel	HW-1.2	14"	8-11-15-12	21 ft. of 2 inch of sch. 40 PVC riser		10
12							12
14							14
16	Br M-C sand, so gravel coarsening up to C-VC sand so. gravel	HW-1.3	15"	8-15-15-14			16
18					2 ft. Bentonite Seal approx. 2 ft above screen		18
20	Beige M-C sand	HW-1.4	16"	6-11-13-19			20
22	Water Table		Water Table		Water Table		22
24	Beige M-C sand	HW-1.5	13"	8-7-6-8	Natural Backfill (coars sand)		24
26							26
28					10 ft. of 2 in. .010 Slot threaded Sch. 40 PVC screen		28
30	Br VC-C sand, so M sand so gravel	HW-1.6	21"	7-7-9-10			30

Proportions Used:

trace (tr)	0 - 10%
little (li)	10 - 20%
some (so)	20 - 35%

Abbreviations:

Brown (Br)	Green = (Gr)	Fine = (F)	Fine to Coarse = F-C
Red (R)	Gray = (Gy)	Medium = (M)	Very = (V)
Orange (Or)	Blue = (Bl)	Coars = (C)	More/Less = (+/-)
Rust (Ru)	Light = (lt)	Dark = (dk)	

H&W, Inc.

BORING LOG

Boring No. HW- 2
Sheet 1 of 1

Project: Steamship Gravel Parking Lot
Client: WHMV + N Steamship Authority
Boring Contractor: Desmond Well Drilling
Boring Equipment: Hollow Stem Auger
Ground Water:

Date	Depth, ft.
2/18/1999	28.5

Date: 2/18/1999
Completion Depth: 35.15
Elevation:
Inspector: JEL

Depth Feet	Description	Sample Number	Penetra./ Recovery	Blow Count	USCS Code	USCS Color	PID (ppm)	Comments	Well Details	Depth Feet
0	grass									0
								Cement Seal		
2										2
	tan m-c SAND, some	S-1	24-Dec	14-19-23-27				Bentonite Seal		
4	m gravel, li f gravel									4
6										6
8	tan m-c SAND, li f gravel	S-2	14/24	5-6-7-10						8
10										10
12	graywacke stuck in spoon									12
	tan f-m SAND	S-3	14/24	6-8-12-16						
14	tan m-c SAND									14
	tan m SAND, so gravel									
16										16
18	tan f-m SAND, so f gravel	S-4	16/24	6-9-9-12						18
20										20
22										22
	tan m-c SAND, tr f gravel	S-5	16/24	5-7-9-12						
24	moist @ 25'									24
26								.010 slot pvc screen		26
28	tan f-m SAND and coarse		24/24	3-4-7-10						28
	sand, some f gravel							Water Table		
30										30
32										32
34										34
36										36

Proportions Used:

trace (tr)	0 - 10%
little (li)	10 - 20%
some (so)	20 - 35%
and	35 - 50%

Abbreviations:

Color

Blue (Bl)	Green (Gr)
Red (R)	Gray (Gy)
Light (lt)	Brown (Br)
Dark (dk)	Orange (Or)
Rust (Ru)	Black (Blk)

Angular

Round (rnd.)
Angular (ang.)

Misc.

Fragments (frag.)
Cement (cem.)
Well-Graded Sand (SW)
Poorly-Graded Sand (SP)
Well-Graded Gravel (GW)
Poorly-Graded Gravel (GP)
Below Land Surface (BLS)
Not Available (N/A)

Size

Fine = (f)
Medium = (m)
Coarse = (c)
Dark = (dk)
Fine to Coarse = (f-c)
Very = (v)
More/Less = (+/-)

H&W, Inc.

BORING LOG

Boring No. HW- 3
Sheet 1 of 1

Project: Steamship Gravel Parking Lot
Client: WHMV + N Steamship Authority
Boring Contractor: Desmond Well Drilling
Boring Equipment: Hollow Stem Auger
Ground Water:

Date	Depth, ft.
4/24/1999	23

Date: 24/24/99
Completion Depth: 37
Elevation:
Inspector: JEL

Depth Feet	Description	Sample Number	Penetra./ Recovery	Blow Count	USCS Code	USCS Color	PID (ppm)	Comments	Well Details	Depth Feet
0										0
								Cement Seal		
2										2
	f-c GRAVEL,	S-1	24/15	12-23-28-26		Br		Bentonite Seal		
4	m-c Sand, tr f Sand									4
6										6
8	f-m SAND, tr c Sand,	S-2	24/15	7-9-10-11		Br				8
	tr f-c Gravel									
10										10
12										12
	f-m SAND, tr c Sand,	S-3	24/15	12-14-12-13		Br				
14	li f-c Gravel									14
								Bentonite Seal		
16										16
18	f-m SAND, tr c Sand,	S-4	24/13	5-9-11-12		Br				18
	tr f Gravel									
20										20
22										22
	f-m SAND, tr c Sand,	S-5	24/15	9-11-10-11		Br				
24	tr f Gravel							Water Table		24
26								.010 slot pvc screen		26
28	f-m SAND, tr c Sand,	S-6	24/14	3-3-5-9		Br				28
	tr f Gravel									
30										30
32										32
34										34
36										36

Proportions Used:

trace (tr)	0 - 10%
little (li)	10 - 20%
some (so)	20 - 35%
and	35 - 50%

Abbreviations:

Color

Blue (Bl)	Green (Gr)
Red (R)	Gray (Gy)
Light (lt)	Brown (Br)
Dark (dk)	Orange (Or)
Rust (Ru)	Black (Blk)

Angular

Round (rnd.)
Angular (ang.)

Misc.

Fragments (frag.)
Cement (cem.)
Well-Graded Sand (SW)
Poorly-Graded Sand (SP)
Well-Graded Gravel (GW)
Poorly-Graded Gravel (GP)
Below Land Surface (BLS)
Not Available (N/A)

Size

Fine = (f)	Fine to Coarse = (f-c)
Medium = (m)	Very = (v)
Coarse = (c)	More/Less = (+/-)
Dark = (dk)	

H&W, Inc.

BORING LOG

Boring No. HW-4m
Sheet 1 of 1

Project: UST investigation
Client: Barnstable Airport
Boring Contractor: Desmond Well Drilling
Boring Equipment: Hollow Stem Auger
Ground Water:

Date	Depth, ft.	M.P.
4/23/01	26	pvc

Date: 4/23/01
Completion Depth: 32
Elevation:
Inspector: JEL
Notes: East of Cape Air Hangar next to HW-4s

Depth Feet	Description	Sample Number	Penetra./ Recovery	Blow Count	PID ppm	USCS Color	USGS Angularity	Comments	Well Details	Depth Feet
0										0
								Cement Seal →		
2										2
								Bentonite Seal →		
4	tan m-c SAND and f-m gravel bands of red-brown	S-1	24/17	7-17-19-15						4
6	gray-tan									6
8										8
	tan m-c SAND	S-2	24/19	4-8-9-12	0					
10										10
12										12
14	no recovery and fine to med gravel	S-3	24/0	7-6-7-6	0					14
16										16
18										18
	tan m SAND, some fine	S-4	24/20	1-2-2-2	0					
20	sand, trace fine gravel									20
22										22
24	tan/grey med SAND, trace fine gravel, trace fine sand	S-5	24/15	1-1-1-1	176					24
26	bottom 6" wet with petroleum							Water Table ▽		26
	odor									
28										28
	cuttings are grey m sand							.010 slot →		
30	with a heavy weathered oil							pvc screen		30
	odor							22-32 bgs		
32									▼	32
34										34
36										36

Proportions Used:

trace (tr)	0 - 10%
little (li)	10 - 20%
some (so)	20 - 35%
and	35 - 50%

Color

Blue (Bl)	Green (Gr)
Red (R)	Gray (Gy)
Light (lt)	Brown (Br)
Dark (dk)	Orange (Or)
Rust (Ru)	Black (Blk)

Angular

Round (rnd.)
Angular (ang.)

Abbreviations:

Misc.

Fragments (frag.)
Cement (cem.)
Well-Graded Sand (SW)
Poorly-Graded Sand (SP)
Well-Graded Gravel (GW)
Poorly-Graded Gravel (GP)
Below Land Surface (BLS)
Not Available (N/A)

Size

Fine = (f)
Medium = (m)
Coarse = (c)
Dark = (dk)
Fine to Coarse = (f-c)
Very = (v)
More/Less = (+/-)

H&W, Inc.

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BORING LOG

Boring No. HW-5
Sheet 1 of 1

Project: Barnstable Airport
Client: Ben Jones, Manager
Boring Contractor: Desmond Well Drilling, Inc.
Boring Equipment: Hollow Stem Auger
Ground Water: Date 6/24/96 Depth, ft. 25' below land surface

Date: 24 June 1996
Completion Depth: 28 feet bls
Elevation: N/A 54.98 *
Inspector: H. Frank

Depth Feet	Description	Sample Number	Penetra./ Recovery	Blow Count	USCS Code	USCS Color	USCS Angularity	Comments	Well Details	Depth Feet
0								Locking road box		0
								Cement seal		
2								Bentonite seal		2
	F-C poorly graded sand w/	HW-5.1	15"/24"	34-28-32-30	SP	Br	rnd-submd			
4	>15% gravel, dry, no odor, no									4
	cement, 2" Br layer of silt									
6	PID: 0.0									6
8	F-M-C well graded sand w/	HW-5.2	11.5"/24"	18-18-24-27	SW	Br-	rnd-submd			8
	<15% gravel, dry, no cement					lt Br-		Native backfill		
10	no odor, PID: 0.0					Beige				10
12										12
	F-VC poorly graded sand w/	HW-5.3	15"/24"	14-36-27-47	SP	Br-	rnd-submd			
14	>15% gravel, dry, no odor,					lt Br-		23 ft. of sch. 40, threaded PVC riser		14
	no cement, PID: 0.0					Beige				
16										16
18	F-VC poorly graded sand w/	HW-5.4	14"/24"	12-20-24-24	SP	Br -	rnd-submd			18
	>15% gravel, dry, no odor, so					lt Br-		Bentonite Seal		
20	rock frags, Fe stain layer					Beige				20
	no cement, PID: 0.0							Native Backfill		
22										22
	F-M-C well graded sand w/	HW-5.5	15"/24"	6-8-10-14	SW	lt Br	rnd-submd	5 ft. of .010 slot, threaded PVC		
24	<15% gravel, dry, no odor					Beige		screen		24
	, no cement, PID: 3.1							WATER TABLE		
26										26
28	F-M-C well graded sand	HW-5 6	17"/24"	1-1-1-1	SW	Gy	rnd-submd	BOTTOM OF HOLE		28
	w/ <15% gravel, wet, no									
30	cement, strong petroleum									30
	odor, PID: 333 ppm									
32										32
34										34
36										36

Proportions Used:

trace (tr)	0 - 10%
little (ll)	10 - 20%
some (so)	20 - 35%

Abbreviations:

Color

Blue (Bl)	Green (Gr)
Red (R)	Gray (Gy)
Light (lt)	Brown (Br)
Dark (dk)	Orange (Or)
Rust (Ru)	Black (Blk)

Angular

Round (rnd.)
Angular (ang.)

Misc.

Fragments (frag.)
Cement (Cem.)
Well-Graded (W-G)
Poorly-Graded (P-G)
Not Available (N/A)

Size

Fine = (F)
Medium = (M)
Coarse = (C)
Dark = (dk)
Fine to Coarse = F-C
Very = (V)
More/Less = (+/-)

H&W, Inc.

BORING LOG

Boring No. HW-23
Sheet 1 of 1

Project: AS/SVE Installation
Client: Barnstable Airport
Boring Contractor: Desmond Well Drilling
Boring Equipment: Hollow Stem Auger
Ground Water:

Date	Depth, ft.	M.P.
5/11/99	23'	pvc

Date: 5/11/99
Completion Depth: 29
Elevation:
Inspector: JEL
Notes: Downgradient of downgradient as fence

Depth Feet	Description	Sample Number	Penetra./ Recovery	Blow Count	PID ppm	USCS Color	USGS Angularity	Comments	Well Details	Depth Feet
0	No samples taken							Cement Seal		0
2								Bentonite Seal		2
4										4
6										6
8										8
10										10
12										12
14										14
16										16
18										18
20										20
22								▽		22
24								Water Table		24
26								.010 slot pvc screen		26
28								19 - 29 bgs		28
30										30
32										32
34										34
36										36

Proportions Used:

trace (tr)	0 - 10%
little (li)	10 - 20%
some (so)	20 - 35%
and	35 - 50%

Color

Blue (Bl)	Green (Gr)
Red (R)	Gray (Gy)
Light (lt)	Brown (Br)
Dark (dk)	Orange (Or)
Rust (Ru)	Black (Blk)

Angular

Round (rnd.)
Angular (ang.)

Abbreviations:

Misc.

Fragments (frag.)
Cement (cem.)
Well-Graded Sand (SW)
Poorly-Graded Sand (SP)
Well-Graded Gravel (GW)
Poorly-Graded Gravel (GP)
Below Land Surface (BLS)
Not Available (N/A)

Size

Fine = (f)
Medium = (m)
Coarse = (c)
Dark = (dk)
Fine to Coarse = (f-c)
Very = (v)
More/Less = (+/-)

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HYA\11072 (697 Barnstable Airport)\ boring logs

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MONITORING WELL BORING LOG

Boring No. HW-A(s) (cape gun works)

Project: 17027- Barnstable On-call #4
Client: Barnstable Minicipal Airport
Boring Contractor: New england Goetech
Boring Equipment: Direct Push, 3" casing

Date: 3/16/2017
Completion Depth: 32' bgs
Elevation:
Inspector: JDB

Proportions Used:

trace (tr)	0 - 10%
little (li)	10 - 20%
some (so)	20 - 35%
and	35 - 50%

Abbreviations:

Color

Blue (Bl)	Green (Gr)
Red (R)	Gray (Gy)
Light (lt)	Brown (Br)
Dark (dk)	Orange (Or)
Rust (Ru)	Black (Blk)

Angular

Round (rnd.)
Angular (ang.)

Misc.

Fragments (frag.)
Cement (cem.)
Well-Graded Sand (SW)
Poorly-Graded Sand (SP)
Well-Graded Gravel (GW)
Poorly-Graded Gravel (GP)
Below Land Surface (BLS)
Not Available (N/A)

Size

Fine = (f)
Medium = (m)
Coarse = (c)
Dark = (dk)
Fine to Coarse = (f-c)
Very = (v)
More/Less = (+/-)

Depth Feet	Description	Penetration	Recovery	USCS Code	USCS Color	PID (parts per million)	Comments	Well Details	Depth Feet
0	0"-4" asphalt						Cement		0
	0-5' bgs — Light Brown M-C sand, some F sand, little gravel		30"	ang	brn		#2 sand @ 6" bgs Bontonite @ 2' bgs		
5							#2 sand @ 4' bgs		5
	5-10' bgs — Light Brown M-C sand, some F sand, little gravel; bottom 6" F white sand		43"	ang	brn				
10									10
	10-15' bgs — 0-9"- Drk Br, M-C sand; some F sand; 9-32" - Lt Br, F-M sand; 22-26" - Drk Br, M-C sand; 32-48" - Lt Br, F-M sand		48"	ang	brn				
15									15
	15-20' bgs — 0-27" - Lt Br, M-C sand, some F sand; 27-43" - Drk Br, M-C sand; some F sand		43"	ang	brn				
20									20
	20-25' bgs — 0-12" - Lt Br, M-C sand; 12+" - Drk Br, M-C sand, some gravel		48"	ang	brn		0.02 slot screen @ 22-32 ' bgs		
25							Groundwater @ 25.5' bgs		25
	25-30' bgs — 0-24" - Lt Br, M-C sand, some F sand; 24+" - Drk Br, M-C sand; some F sand		43"	ang	brn				
30									30
35									
40									
45									
50									
55									

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MONITORING WELL BORING LOG

Boring No. HW-B(d)

Project: 17027- Barnstable On-call #4
Client: Barnstable Minicipal Airport
Boring Contractor: New england Goetech
Boring Equipment: Direct Push, 3" casing

Date: 4/3/2017
Completion Depth: 57.2' bgs
Elevation:
Inspector: JDB

Proportions Used:

trace (tr)	0 - 10%
little (li)	10 - 20%
some (so)	20 - 35%
and	35 - 50%

Color

Blue (Bl)	Green (Gr)
Red (R)	Gray (Gy)
Light (lt)	Brown (Br)
Dark (dk)	Orange (Or)
Rust (Ru)	Black (Blk)

Abbreviations:

Angular
Round (rnd.)
Angular (ang.)

Misc.
Fragments (frag.)
Cement (cem.)
Well-Graded Sand (SW)
Poorly-Graded Sand (SP)
Well-Graded Gravel (GW)
Poorly-Graded Gravel (GP)
Below Land Surface (BLS)
Not Available (N/A)

Size
Fine = (f)
Medium = (m)
Coarse = (c)
Dark = (dk)
Fine to Coarse = (f-c)
Very = (v)
More/Less = (+/-)

Depth Feet	Description	Penetration	Recovery	USCS Code	USCS Color	PID (parts per million)	Comments	Well Details	Depth Feet
0							Cement → #2 sand @ 9" bgs →		0
5									5
10							Bentonite @ 12' bgs →		10
15							#2 sand @ 15' bgs →		15
20									20
25							Groundwater @ 22.75' bgs		25
30	30-35' bgs	0-16" - Lt Br, M sand, some C sand/gravel; 16-19" - Med Br, F sand, little gravel	19"	ang	brn				30
35	35-40' bgs	Lt brn, M sand, some C sand/silt.gravel	2"	ang	brn				35
40	40-45' bgs	Lt brn, M sand, some C sand/silt.gravel	2"	ang	brn				40
45	45-50' bgs	0-9" - Lt Br, M sand, some F/C sand; 9-12" - Lt Br, F sand, some silt, little gravel	12"	ang	brn		0.02 slot screen @ 47.2-57.2 ' bgs →		45
50	50-55' bgs	NO RECOVERY	0"						50
55	55-60' bgs	Lt Br, well graded sand, some gravel	19"	ang	brn				55
60									60

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MONITORING WELL BORING LOG

Boring No. HW-B(s)

Project: 17027- Barnstable On-call #4
Client: Barnstable Minicipal Airport
Boring Contractor: New england Goetech
Boring Equipment: Direct Push, 3" casing

Date: 3/16/2017
Completion Depth: 30.5' bgs
Elevation:
Inspector: JDB

Proportions Used:

trace (tr)	0 - 10%
little (li)	10 - 20%
some (so)	20 - 35%
and	35 - 50%

Abbreviations:

Color

Blue (Bl)	Green (Gr)
Red (R)	Gray (Gy)
Light (lt)	Brown (Br)
Dark (dk)	Orange (Or)
Rust (Ru)	Black (Blk)

Angular

Round (rnd.)
Angular (ang.)

Misc.

Fragments (frag.)
Cement (cem.)
Well-Graded Sand (SW)
Poorly-Graded Sand (SP)
Well-Graded Gravel (GW)
Poorly-Graded Gravel (GP)
Below Land Surface (BLS)
Not Available (N/A)

Size

Fine = (f)
Medium = (m)
Coarse = (c)
Dark = (dk)
Fine to Coarse = (f-c)
Very = (v)
More/Less = (+/-)

Depth Feet	Description		Penetration	Recovery	USCS Code	USCS Color	PID (parts per million)	Comments	Well Details	Depth Feet
0	0"-6" Organic							Cement		0
	0-5' bgs	0-6" - Lt Br, M-C sand, some F sand; 6-18" - Med Br, M-C sand, some F sand; 18+" - Drk Br, F-M sand, some C sand		50"	ang	brn		#2 sand @ 9" bgs		
5										5
	5-10' bgs	0-10" - Lt Br, F-M sand, some C sand 10+" - Med Br, M-C sand, some F sand		45"	ang	brn				
10										10
	10-15' bgs	0-12" - Med Br, M-C sand, some F sand/gravel; 12-36" - Lt Br, C sand, some F-M sand, little gravel; 36+" - Drk Br, F-M sand, some C/gravel		52"	ang	brn		Bentonite @ 12' bgs		
15								#2 sand @ 15' bgs		15
	15-20' bgs	0-20" - Lt Br, F-M sand; 20+" - F-M sand, some C sand, and large gravel		60"	ang	brn				
20										20
	20-25' bgs	0-12" - Med Br, M-C sand, some F sand; 12-16" - Lt Br, F-M sand; 16-22" - Med Br, M-C sand, some F sand; 22+" - Lt Br, F-M sand		48"	ang	brn		0.02 slot screen @ 20.5-30.5 ' bgs		
25								Groundwater @ 23.5' bgs		25
	25-30' bgs	M-C sand, some Fsand/gravel		36"	ang	brn				
30										30
35										
40										
45										
50										
55										

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MONITORING WELL BORING LOG

Boring No. HW-C

Project: 17027- Barnstable On-call #4
Client: Barnstable Minicipal Airport
Boring Contractor: New england Goetech
Boring Equipment: Direct Push, 3" casing

Date: 3/16/2017
Completion Depth: 42.5' bgs
Elevation:
Inspector: JDB

Proportions Used:

trace (tr)	0 - 10%
little (li)	10 - 20%
some (so)	20 - 35%
and	35 - 50%

Abbreviations:

Color

Blue (Bl)	Green (Gr)
Red (R)	Gray (Gy)
Light (lt)	Brown (Br)
Dark (dk)	Orange (Or)
Rust (Ru)	Black (Blk)

Angular

Round (rnd.)
Angular (ang.)

Misc.

Fragments (frag.)
Cement (cem.)
Well-Graded Sand (SW)
Poorly-Graded Sand (SP)
Well-Graded Gravel (GW)
Poorly-Graded Gravel (GP)
Below Land Surface (BLS)
Not Available (N/A)

Size

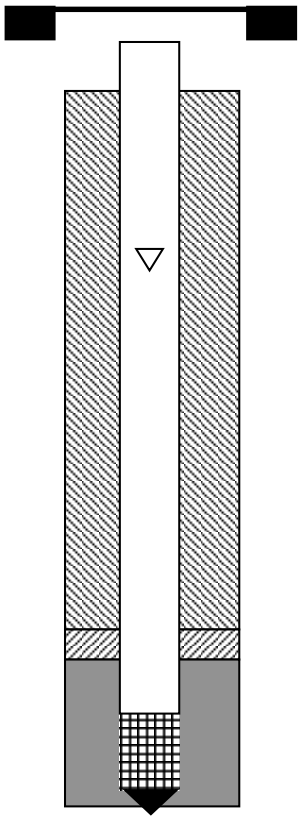
Fine = (f)
Medium = (m)
Coarse = (c)
Dark = (dk)
Fine to Coarse = (f-c)
Very = (v)
More/Less = (+/-)

Depth Feet	Description	Penetration	Recovery	USCS Code	USCS Color	PID (parts per million)	Comments	Well Details	Depth Feet
0	0"-12" Organic						Cement →		0
	0-5' bgs — 0-8" - M-C sand, little gravel; 8-26" - Lt Br, F sand, some silt; 26-32" - Or Br, F-M sand; 32-44 - Organic		44"	ang	brn		#2 sand @ 9" bgs →		
5							→		5
	5-10' bgs — 0-16" - Drk Br, C sand, some Fsand/gravel; 16-30" - Med Br, M sand, some F sand/gravel; 30-34" - Lt Br, F sand; 34+" - Or Br, M-C sand, little Fsand/silt		44"	ang	brn		Bontonite @ 12' bgs → #2 sand @ 7' bgs		
10									10
	10-15' bgs — Med Br, M-C sand, some F sand/large gravel (1"+);		45"	ang	brn				
15									15
	15-20' bgs — Med Br, M-C sand, some F sand		53"	ang	brn				
20									20
	20-25' bgs — 0-6" - Or Br, M-C sand, some gravel; 6-12" - Lt Br, F-M sand, some gravel; 12-26" - Lt Br, F sand; 26+" - Med Br, M-C sand, little F sand, some gravel		55"	ang	brn				
25									25
	25-30' bgs — 0-18" - Lt Br, F-M sand, little C sand; 18+" - Med Br, F sand, some M sand/gravel		36"	ang	brn				
30									30
	30-35' bgs — 0-12" - Lt Br, F sand, little C sand; 12+" - Med Br, C sand, some F-M sand, little gravel		48"				0.02 slot screen @ 32.5-42.5 ' bgs →		
35									
	35-42" bgs — NO SAMPLE COLLECTED		0"						
40							Groundwater @ 39.3' bgs →		
45									
50									
55									

Cape Cod Test Boring	Project	Boring No. HW-D (d)
5 Rayber Road, Orleans, MA 02653	Horsley Witten Group	
(508) 240-1000	Barnstable, 480 Barnstable Road	Sheet 1 of 1
div. Desmond Well Drilling, Inc.	Hyannis, MA	

Driller: Tommy Desmond	Boring location: Cluster by solar field (41.67230, -70.27519)	
Helper: Sean Morgan	Ground Surface Elevation:	
Inspector: Josephine Ibanez	Date start: 5/15/2019	Date end: 5/15/2019
Sampler consists of a two inch split spoon driven using a 140 lb. hammer falling thirty inches	Notes:	Auger Size: 6 1/4" x 4" H.S.A Casing Size: 2"x39.75' SCH40 PVC FJT Screen Size: 2"x5'X.010 SCH40 PVC FJT

Depth	Sample			Sample Description	Well Installation
(FT)	NO	PEN/REC	DEPTH/FT		
2					
0			0 - 15	F-M-C brown sand and gravel. Dry.	
-2					
-4					
-6					
-8					
-10					
-12					
-14					
-16			15 - 45	F-M-C brown sand. Wet.	
-18					
-20					
-22					
-24					
-26					
-28					
-30					
-32					
-34					
-36					
-38					
-40					
-42					
-44					
-46					
-48					
-50					
-52					
?					
-57					
-62					
-67					
-72					



Not to scale
Well Depth: 44.75'
Static: 18.25'
Well screen: 39.75' to 44.75'
Grout: 3' to 34'
Bentonite seal: 34' to 36'
Sand pack: 36' to 44.75'
End of boring: 45'
End of sample: N/A

Granular Soils		Cohesive Soils		Proportions Used
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0 - 4	V. LOOSE	> 2	V. SOFT	Trace 0 - 10%
4 - 10	LOOSE	2 - 4	SOFT	Little 10 - 20%
10 - 30	M. DENSE	4 - 8	M. STIFF	Some 20 - 35%
30 - 50	DENSE	8 - 15	STIFF	And 35 - 50%
> 50	V. DENSE	15 - 30	V. STIFF	
		> 30	HARD	

Well Installation Key
- CONCRETE
- SAND PACK
- GROUT
- BENTONITE
- SCREEN
- APPROX. WATER LEVEL

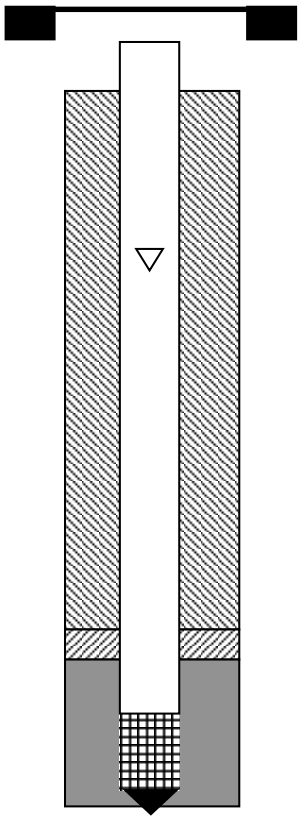
CAPE COD TEST BORING **BORING NO. HW-D (d)**

Cape Cod Test Boring	Project	Boring No. HW-D (dd)
5 Rayber Road, Orleans, MA 02653	Horsley Witten Group	
(508) 240-1000	Barnstable, 480 Barnstable Road	Sheet 1 of 1
div. Desmond Well Drilling, Inc.	Hyannis, MA	

Driller: Tommy Desmond	Boring location: Cluster by solar field (41.67230, -70.27519)	
Helper: Sean Morgan	Ground Surface Elevation:	
Inspector: Josephine Ibanez	Date start: 5/14/2019	Date end: 5/14/2019
Sampler consists of a two inch split spoon driven using a 140 lb. hammer falling thirty inches	Notes:	Auger Size: 6 1/4" x 4" H.S.A Casing Size: 2"x59.4' SCH40 PVC FJT Screen Size: 2"x5'X.010 SCH40 PVC FJT

Depth	Sample			Sample Description
(FT)	NO	PEN/REC	DEPTH/FT	
2				
0				
-2				
-4				
-6				
-8				
-10				
-12				
-14				
-16				
-18				
-20				
-22				
-24				
-26				
-28	1	24/16	27 - 29	F-M-C brown sand; little gravel. Wet.
-30				
-32	2	24/24	32 -34	F-M-C light brown sand; trace gravel. Wet.
-34				
-36				
-38	3	24/0	37 - 39	No recovery.
-40				
-42	4	24/20	42 - 44	F-M-C light gray sand; trace gravel. Wet.
-44				
-46				
-48	5	24/21	47 - 49	F-M-C light gray sand; little clay. Wet.
-50				
-52	6	24/8	52 - 54	F-M-C dark brown silty sand; some clay. Wet.
?				
-57	7	24/17	57 - 59	F-M-C light brown sand; trace gravel. Wet.
-62	8	24/13	62 - 64	F-M-C light brown sand. Wet.
-67	9	24/13	67 - 69	F-M-C red/brown sand and clay. Wet.
-72				

Well Installation



Not to scale

Well Depth: 64.9'
Static: 19.95'
Well screen: 59.9' to 64.9'
Grout: 3' to 55'
Bentonite seal: 55' to 57'
Sand pack: 57' to 64.9'
End of boring: 67'
End of sample: 69'

Granular Soils		Cohesive Soils		Proportions Used
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0 - 4	V. LOOSE	> 2	V. SOFT	Trace 0 - 10%
4 - 10	LOOSE	2 - 4	SOFT	Little 10 - 20%
10 - 30	M. DENSE	4 - 8	M. STIFF	Some 20 - 35%
30 - 50	DENSE	8 - 15	STIFF	And 35 - 50%
> 50	V. DENSE	15 - 30	V. STIFF	
		> 30	HARD	

Well Installation Key
- CONCRETE
- SAND PACK
- GROUT
- BENTONITE
- SCREEN
- APPROX. WATER LEVEL

CAPE COD TEST BORING **BORING NO. HW-D (dd)**

Horsley Witten Group
Sustainable Environmental Solutions
90 Route 6A • Sandwich, MA • 02563
Tel: 508-833-6600 • Fax: 508-833-3150 • www.horsleywitten.com

MONITORING WELL BORING LOG

Boring No. HW-D

Project: 17027- Barnstable On-call #4
Client: Barnstable Minicipal Airport
Boring Contractor: New england Goetech
Boring Equipment: Direct Push, 3" casing

Date: 3/17/2017
Completion Depth: 29.5' bgs
Elevation:
Inspector: JDB

Proportions Used:

trace (tr)	0 - 10%
little (li)	10 - 20%
some (so)	20 - 35%
and	35 - 50%

Abbreviations:

Color

Blue (Bl)	Green (Gr)
Red (R)	Gray (Gy)
Light (lt)	Brown (Br)
Dark (dk)	Orange (Or)
Rust (Ru)	Black (Blk)

Angular

Round (rnd.)
Angular (ang.)

Misc.

Fragments (frag.)
Cement (cem.)
Well-Graded Sand (SW)
Poorly-Graded Sand (SP)
Well-Graded Gravel (GW)
Poorly-Graded Gravel (GP)
Below Land Surface (BLS)
Not Available (N/A)

Size

Fine = (f)	Fine to Coarse = (f-c)
Medium = (m)	Very = (v)
Coarse = (c)	More/Less = (+/-)
Dark = (dk)	

Depth Feet	Description	Penetration	Recovery	USCS Code	USCS Color	PID (parts per million)	Comments	Well Details	Depth Feet
0	0"-6" Organic						Cement #2 sand @ 1' bgs		0
	0-5' bgs — 0-30" - Or Br, M sand, little F/C sand/gravel; 30-42" - F-M sand, some C sand/gravel; 42-48" - Organic		48"	ang	brn				
5									5
	5-10' bgs — 0-16" - Med Br, C sand, little F-M sand/large gravel; 16-24" - Med Br, M sand, little F sand, some C sand/gravel; 24+" - Med Br, C sand, little F-M sand/large gravel		42"	ang	brn		Bontonite @ 7' bgs #2 sand @ 9' bgs		
10									10
	10-15' bgs — 0-20" - Lt Br, M-C sand, some F sand/gravel; 20-43" - Lt Br, C sand, little F sand/gravel, some C sand; 43+" - F-M sand, some C sand/gravel		55"	ang	brn				
15									15
	15-20' bgs — 0-15" - Med Br, M sand, some F/C sand/gravel; 15-25" - F-M sand, some C sand; 25+" - Drk Br, F-M sand, some C sand/gravel		40"	ang	brn				
20							0.02 slot screen @ 16.2-26.2 ' bgs		20
	20-25' bgs — 0-20" - Lt Br, M sand, some C sand, littleF sand/gravel; 20+" - F-M sand, some C sand/gravel		38'	ang	brn		Groundwater @ 22.6' bgs		
25									25
	25-30' bgs — NO SAMPLE COLLECTED, SOIL SLUFFED OUT OF SLEEVE		0"						
30									30
35									
40									
45									
50									
55									

Horsley Witten Group
Sustainable Environmental Solutions
90 Route 6A • Sandwich, MA • 02563
Tel: 508-833-6600 • Fax: 508-833-3150 • www.horsleywitten.com

MONITORING WELL BORING LOG

Boring No. HW-E

Project: 17027- Barnstable On-call #4
Client: Barnstable Minicipal Airport
Boring Contractor: New england Goetech
Boring Equipment: Direct Push, 3" casing

Date: 3/17/2017
Completion Depth: 26.5' bgs
Elevation:
Inspector: JDB

Proportions Used:

trace (tr)	0 - 10%
little (li)	10 - 20%
some (so)	20 - 35%
and	35 - 50%

Abbreviations:

Color

Blue (Bl)	Green (Gr)
Red (R)	Gray (Gy)
Light (lt)	Brown (Br)
Dark (dk)	Orange (Or)
Rust (Ru)	Black (Blk)

Angular

Round (rnd.)
Angular (ang.)

Misc.

Fragments (frag.)
Cement (cem.)
Well-Graded Sand (SW)
Poorly-Graded Sand (SP)
Well-Graded Gravel (GW)
Poorly-Graded Gravel (GP)
Below Land Surface (BLS)
Not Available (N/A)

Size

Fine = (f)	Fine to Coarse = (f-c)
Medium = (m)	Very = (v)
Coarse = (c)	More/Less = (+/-)
Dark = (dk)	

Depth Feet	Description		Penetration	Recovery	USCS Code	USCS Color	PID (parts per million)	Comments	Well Details	Depth Feet
0	0"-4" Organic							Cement		0
	0-5' bgs	0-12" - Med Br, M-C sand, some F sand, little gravel; 12-36" - Med Br, C sand, some F-M sand/gravel		40"	ang	brn		#2 sand @ 1' bgs		
5										5
	5-10' bgs	Med Br, C sand, little M-F sand/gravel		36"	ang	brn		Bontonite @ 6.5' bgs		
10								#2 sand @ 9' bgs		10
	10-15' bgs	0-12" - Lt Br, F sand; 12-24" - Lt Br, F-M sand, some C sand/gravel; 24-32" - Lt Br, F-M sand; 32+" - M-C sand, some F sand/gravel		60"	ang	brn				
15										15
	15-20' bgs	0-12" - Med Br, M-C sand, little F sand/gravel; 12-20" - F sand, some silt; 20+" - C sand, some F-M sand/gravel		58"	ang	brn		0.02 slot screen @ 16.2-26.2 ' bgs		
20								Groundwater @ 19.7' bgs		20
	20-25' bgs	Med Br, F sand, Little M-C sand/gravel ROCK IN SHOE		22"	ang	brn				
25										25
	25-30' bgs	Med Br, C sand, some M sand/gravel		24"	ang	brn				
30										30
35										
40										
45										
50										
55										

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MONITORING WELL BORING LOG

Boring No. HW-F

Project: 17027- Barnstable On-call #4
Client: Barnstable Minicipal Airport
Boring Contractor: New england Goetech
Boring Equipment: Direct Push, 3" casing

Date: 3/17/2017
Completion Depth: 27.2' bgs
Elevation:
Inspector: JDB

Proportions Used:

trace (tr)	0 - 10%
little (li)	10 - 20%
some (so)	20 - 35%
and	35 - 50%

Abbreviations:

Color

Blue (Bl)	Green (Gr)
Red (R)	Gray (Gy)
Light (lt)	Brown (Br)
Dark (dk)	Orange (Or)
Rust (Ru)	Black (Blk)

Angular

Round (rnd.)
Angular (ang.)

Misc.

Fragments (frag.)
Cement (cem.)
Well-Graded Sand (SW)
Poorly-Graded Sand (SP)
Well-Graded Gravel (GW)
Poorly-Graded Gravel (GP)
Below Land Surface (BLS)
Not Available (N/A)

Size

Fine = (f)
Medium = (m)
Coarse = (c)
Dark = (dk)
Fine to Coarse = (f-c)
Very = (v)
More/Less = (+/-)

Depth Feet	Description	Penetration	Recovery	USCS Code	USCS Color	PID (parts per million)	Comments	Well Details	Depth Feet
0	0"-5" Organic						Cement		0
	0-5' bgs — 0-12" - Med Br, M sand, liitle C sand; 12-32" - Drk Br, C sand, some M sand/gravel; 32-40" - Drk Br, F sand, Some M sand/gravel; 40+" - Organic		45"	ang	brn		#2 sand @ 1' bgs		
5									5
	5-10' bgs — C sand, some F-M sand, tr gravel		52"	ang	brn				
10							Bontonite @ 7' bgs		10
	10-15' bgs — 0-16" - Lt Br, M sand, some C; 16-32" - Lt Br, F-M sand; 32-41" - Med Br, M sand, some C sand/gravel; 41+" F-M sand, tr gravel		56"	ang	brn		#2 sand @ 11' bgs		
15									15
	15-20' bgs — M-C sand, some F-M sand, little gravel		52"	ang	brn		0.02 slot screen @ 17.2-27.2 ' bgs		
20							Groundwater @ 22.6' bgs		20
	20-25' bgs — 0-20" - Lt-Med Br, C sand, some F-M sand, little gravel; 20-28" - Gray, F-M sand, little C sand; 28+" - Drk Br, M-C sand, some Fsand/gravel		38'	ang	brn/gray				
25									25
	25-30' bgs — NO SAMPLE COLLECTED, SOIL SLUFFED OUT OF SLEEVE		0"						
30									30
35									
40									
45									
50									
55									

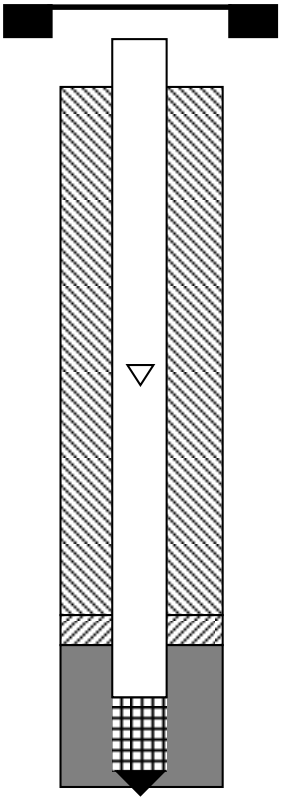
Cape Cod Test Boring	Project	Boring No. HW-G(d)
02653	Horsley Witten Group	
(508) 240-1000	Barnstable, 480 Barnstable Road	Sheet 1 of 1
div. Desmond Well Drilling, Inc.	Hyannis, MA	

Driller: Tommy Desmond	Boring location:
Helper: Sean Morgan	Ground Surface Elevation:
Inspector: Josephine Ibanez	Date start: 10/1/2018 Date end: 10/2/2018

Sampler consists of a two inch split spoon driven using a 140 lb. hammer falling thirty inches	Notes:	Auger Size: 6 1/4" x 4" H.S.A Casing Size: 2"x43.3' SCH40 PVC FJT Screen Size: 2"x5'X.010 SCH40 PVC FJT

Depth	Sample			Sample Description
(FT)	NO	PEN/REC	DEPTH/FT	
2				
0	1	24/14	0 - 2	Loamy sand. F-M-trace C brown sand. Dry.
-2	2	24/14	2 - 4	F-M-C brown sand; trace gravel. Dry.
-4	3	24/13	4 - 6	F-M-C brown sand; some cobble. Dry.
-6	4	24/15	6 - 8	F-M-C brown sand; trace cobble. Dry.
-8	5	24/14	8 - 10	F-M-C brown sand; some cobble. Dry.
-10	6	24/15	10 - 12	F-M-C brown sand; some cobble. Dry.
-12	7	24/14	12 - 14	F-M-C brown sand; trace cobble. Dry.
-14	8	24/17	14 - 16	F-M-C brown sand; trace gravel. Dry.
-16	9	24/17	16 - 18	F-M-C brown sand; trace gravel. Dry.
-18	10	24/17	18 - 20	F-M-C brown sand; trace gravel. Dry.
-20	11	24/17	20 - 22	F-M-C brown sand; trace gravel. Dry.
-22	12	24/13	22 - 24	F-M-C brown sand. Wet at 24'.
-24	13	24/3	24 - 26	Rock jammed in top of spoon.
-26	14	24/0	26 - 28	No recovery basket broke.
-28	15		28 - 30	F-M-C brown sand; trace gravel. Wet.
-30	16	24/11	30 - 32	F-M-C brown sand; trace gravel. Wet.
-32	17	24/13	32 -34	F-M-C brown sand; trace gravel. Wet.
-34	18	24/10	34 - 36	F-M-C brown sand; trace gravel. Wet.
-36	19	24/0	36 - 38	No recovery.
-38	20	24/12	38 - 40	F-M-C brown sand; trace silt, trace gravel. Wet.
-40	21	24/11	40 - 42	F-M-C brown sand; trace gravel. Wet.
-42	22	24/9	42 - 44	F-M-C brown sand; trace gravel. Wet.
-44	23	24/13	44 - 46	F-M-C light brown sand. Wet.
-46	24	24/12	46 - 48	F-M-C brown sand; trace silt. Wet.
-48	25	24/13	48 - 50	F-M-C brown sand; trace silt; trace clay. Wet.
-50	26	24/19	50 - 52	Blue clay. Wet.
-52				
-54				
-56				
-58				
-60				
-62				
-64				
-66				

Well Installation



Well Depth: 48.30'
Static: 22.30'
Well screen: 43.3' to 48.3'
Grout: 5' to 38'
Bentonite seal: 38' to 40'
Sand pack: 40' to 48.3'
End of boring: 50'
End of sample: 52'

Granular Soils		Cohesive Soils		Proportions Used
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0 - 4	V. LOOSE	> 2	V. SOFT	Trace 0 - 10%
4 - 10	LOOSE	2 - 4	SOFT	Little 10 - 20%
10 - 30	M. DENSE	4 - 8	M. STIFF	Some 20 - 35%
30 - 50	DENSE	8 - 15	STIFF	And 35 - 50%
> 50	V. DENSE	15 - 30	V. STIFF	
		> 30	HARD	

Well Installation Key
- CONCRETE
- SAND PACK
- GROUT
- BENTONITE
- SCREEN
- APPROX. WATER LEVEL

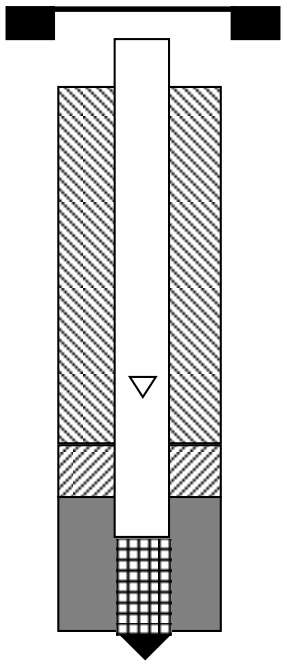
CAPE COD TEST BORING	**BORING NO. GW - Deep well**

Cape Cod Test Boring	Project	Boring No. HW-G(m)
5 Rayber Road, Orleans, MA 02653	Horsley Witten Group	
(508) 240-1000	Barnstable, 480 Barnstable Road	Sheet 1 of 1
div. Desmond Well Drilling, Inc.	Hyannis, MA	

Driller: Tommy Desmond	Boring location:
Helper: Sean Morgan	Ground Surface Elevation:
Inspector: Josephine Ibanez	Date start: 10/3/2018 Date end: 10/3/2018

Sampler consists of a two inch split spoon driven using a 140 lb. hammer falling thirty inches	Notes: Middle	Auger Size: 6 1/4" x 4" H.S.A Casing Size: 2"x33.25' SCH40 PVC FJT Screen Size: 2"x5'X.010 SCH40 PVC FJT

Depth	Sample				Sample Description	Well Installation
(FT)	NO	PEN/REC	DEPTH/FT	BLOWS 6"		
2					Drilled straight with H.S.A.	
0			0 - 10		F-M-C brown sand; gravel. Dry.	
-2						
-4						
-6						
-8						
-10			10 - 40		F-M-C brown sand.	
-12					Water encountered at 22.35'.	
-14						
-16						
-18						
-20						
-22						
-24						
-26						
-28						
-30						
-32						
-34						
-36						
-38						
-40						
-42						
-44						
-46						
-48						
-50						
-52						Well Depth: 38.25'
-54						Static: 22.35'
-56						Well screen: 33.25' to 38.25'
-58						Grout: 5' to 27.25'
-60						Bentonite seal: 27.25' to 30.25'
-62						Sand pack: 30.25' to 38.25'
-64						End of boring: 40'
-66						End of sample: n/a



Granular Soils		Cohesive Soils		Proportions Used
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0 - 4	V. LOOSE	> 2	V. SOFT	Trace 0 - 10%
4 - 10	LOOSE	2 - 4	SOFT	Little 10 - 20%
10 - 30	M. DENSE	4 - 8	M. STIFF	Some 20 - 35%
30 - 50	DENSE	8 - 15	STIFF	And 35 - 50%
> 50	V. DENSE	15 - 30	V. STIFF	
		> 30	HARD	

Well Installation Key
- CONCRETE
- SAND PACK
- GROUT
- BENTONITE
- SCREEN
- APPROX. WATER LEVEL

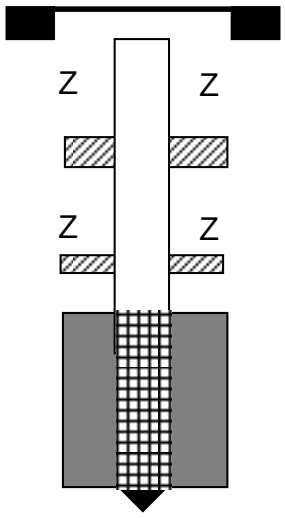
CAPE COD TEST BORING **BORING NO. GW - Middle well**

Cape Cod Test Boring	Project	Boring No. HW-G(s)
5 Rayber Road, Orleans, MA 02653	Horsley Witten Group	
(508) 240-1000	Barnstable, 480 Barnstable Road	Sheet 1 of 1
div. Desmond Well Drilling, Inc.	Hyannis, MA	

Driller: Tommy Desmond	Boring location:	
Helper: Sean Morgan	Ground Surface Elevation:	
Inspector: Josephine Ibanez	Date start: 10/3/2018	Date end: 10/3/2018

Sampler consists of a two inch split spoon driven using a 140 lb. hammer falling thirty inches	Notes: Shallow	Auger Size: 6 1/4" x 4" H.S.A Casing Size: 2"x18.45' SCH40 PVC FJT Screen Size: 2"x10'X.010 SCH40 PVC FJT

Depth	Sample				Sample Description	Well Installation
(FT)	NO	PEN/REC	DEPTH/FT	BLOWS 6"		
2					Drilled straight with H.S.A.	
0			0 -10		F-M-C brown sand; Gravel. Dry.	
-2						
-4						
-6						
-8						
-10			10 - 40		F-M-C brown sand.	
-12					Water encountered at 22.29'.	
-14						
-16						
-18						
-20						
-22						
-24						
-26						
-28						
-30						
-32						
-34						
-36						
-38						
-40						
-42						
-44						
-46						
-48						
-50						
-52						Well Depth: 28.45'
-54						Static: 22.29'
-56						Well screen: 18.45' to 28.45'
-58						Bentonite seal: 8' to 10'
-60						Bentonite seal: 15' to 16'
-62						Sand pack: 18.25' to 28.45'
-64						End of boring: 30'
-66						End of sample: n/a



Granular Soils		Cohesive Soils		Proportions Used
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0 - 4	V. LOOSE	> 2	V. SOFT	Trace 0 - 10%
4 - 10	LOOSE	2 - 4	SOFT	Little 10 - 20%
10 - 30	M. DENSE	4 - 8	M. STIFF	Some 20 - 35%
30 - 50	DENSE	8 - 15	STIFF	And 35 - 50%
> 50	V. DENSE	15 - 30	V. STIFF	
		> 30	HARD	

Well Installation Key
- CONCRETE
- SAND PACK
- Z - SOIL BACKFILL
- BENTONITE
- SCREEN
- APPROX. WATER LEVEL

CAPE COD TEST BORING	**BORING NO. GW - Shallow well**

Cape Cod Test Boring	Project	Boring No. HW - H
5 Rayber Road, Orleans, MA 02653	Horsley Witten Group	
(508) 240-1000	Barnstable, 480 Barnstable Road	Sheet 1 of 1
div. Desmond Well Drilling, Inc.	Hyannis, MA	

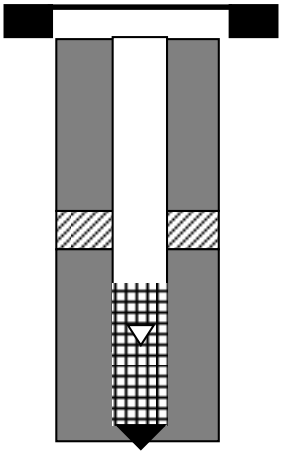
Driller: Tommy Desmond	Boring location:
Helper: Sean Morgan	Ground Surface Elevation:
Inspector: Josephine Ibanez	Date start: 10/4/2018 Date end: 10/4/2018

Direct push sampler consists of 4' x 2 3/8" G3 dual tube direct push steel tooling with 4' x 1 1/2" PVC liner with 201 ft lb hydraulic hammer (percussion rate 2200 bpm)

Auger Size: 6 1/4" x 4" H.S.A
Casing Size: 2"x17.11' SCH40 PVC FJT
Screen Size: 2"x10'X.010 SCH40 PVC FJT

Depth	Sample				Sample Description
(FT)	NO	PEN/REC	DEPTH/FT	BLOWS 6"	
2					
0	1	N/R	0 - 4	N/R	Loamy; F-M brown sand; trace silt.
-2					Dry.
-4	2		4 - 8		F-M-C brown sand; little F-M
-6					gravel. Dry.
-8	3		8 - 12		F-M-C brown sand; trace F gravel.
-10					Dry.
-12	4		12 - 16		F-M-C brown sand. Dry.
-14					
-16	5		16 - 20		F-M-C brown sand; trace F gravel.
-18					Dry.
-20	6		20 - 24		F-M-C brown sand. Wet.
-22					
-24	7		24 - 28		F-M-C brown sand. Wet.
-26					
-28					
-30					
-32					
-34					
-36					
-38					
-40					
-42					
-44					
-46					
-48					
-50					
-52					
-54					
-56					
-58					
-60					
-62					
-64					
-66					

Well Installation



Well Depth: 27.11'
Static: 20.68'
Well screen: 17.11' to 27.11'
Sand pack: 0' to 13'
Bentonite seal: 13' to 15'
Sand pack: 15' to 27.11'
End of boring: 24'
End of sample: 28'

Granular Soils		Cohesive Soils	
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY
0 - 4	V. LOOSE	> 2	V. SOFT
4 - 10	LOOSE	2 - 4	SOFT
10 - 30	M. DENSE	4 - 8	M. STIFF
30 - 50	DENSE	8 - 15	STIFF
> 50	V. DENSE	15 - 30	V. STIFF
		> 30	HARD

Proportions Used

Trace 0 - 10%
Little 10 - 20%
Some 20 - 35%
And 35 - 50%

Well Installation Key

- CONCRETE
- SAND PACK
- SOIL BACKFILL
- BENTONITE
- SCREEN
- APPROX. WATER LEVEL

CAPE COD TEST BORING **BORING NO. HW - H**

Cape Cod Test Boring	Project	Boring No. HW - I
5 Rayber Road, Orleans, MA 02653	Horsley Witten Group	
(508) 240-1000	Barnstable, 480 Barnstable Road	Sheet 1 of 1
div. Desmond Well Drilling, Inc.	Hyannis, MA	

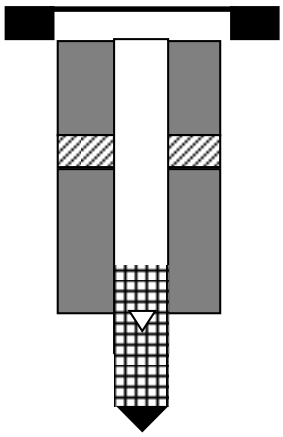
Driller: Tommy Desmond	Boring location:
Helper: Sean Morgan	Ground Surface Elevation:
Inspector: Josephine Ibanez	Date start: 10/4/2018 Date end: 10/4/2018

Direct push sampler consists of 4' x 2 3/8" G3 dual tube direct push steel tooling with 4' x 1 1/2" PVC liner with 201 ft lb hydraulic hammer (percussion rate 2200 bpm)

Auger Size: 6 1/4" x 4" H.S.A
Casing Size: 2"x15.1' SCH40 PVC FJT
Screen Size: 2"x10'X.010 SCH40 PVC FJT

Depth	Sample				Sample Description
(FT)	NO	PEN/REC	DEPTH/FT	BLOWS 6"	
2					
0	1	N/R	0 - 4	N/R	Loamy; silty sand; F-M gravel;
-2					F-M-C brown sand. Dry.
-4	2		4 - 8		F-M-C brown sand; trace F gravel.
-6					Dry.
-8	3		8 - 12		F-M-C brown sand. Dry.
-10					
-12	4		12 - 16		F-M-C brown sand. Dry.
-14					
-16	5		16 - 20		F-M-C brown sand; trace very C
-18					brown sand; trace F gravel. Wet.
-20	6		20 - 24		F-M-C brown sand. Wet.
-22					
-24	7		24 - 28		F-M-C brown sand. Wet.
-26					
-28					
-30					
-32					
-34					
-36					
-38					
-40					
-42					
-44					
-46					
-48					
-50					
-52					
-54					
-56					
-58					
-60					
-62					
-64					
-66					

Well Installation



Well Depth: 25.10'
Static: 18.62'
Well screen: 15.1' to 25.1'
Sand pack: 0' to 8'
Bentonite seal: 8' to 10'
Sand pack: 10' to 18.62'
End of boring: 24'
End of sample: 28'

Granular Soils		Cohesive Soils		Proportions Used
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0 - 4	V. LOOSE	> 2	V. SOFT	Trace 0 - 10%
4 - 10	LOOSE	2 - 4	SOFT	Little 10 - 20%
10 - 30	M. DENSE	4 - 8	M. STIFF	Some 20 - 35%
30 - 50	DENSE	8 - 15	STIFF	And 35 - 50%
> 50	V. DENSE	15 - 30	V. STIFF	
		> 30	HARD	

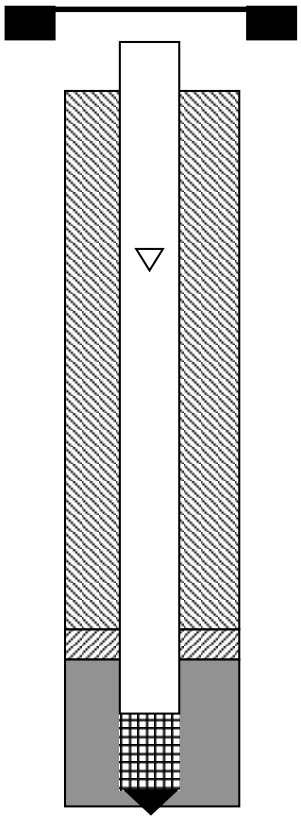
Well Installation Key
- CONCRETE
- SAND PACK
- SOIL BACKFILL
- BENTONITE
- SCREEN
- APPROX. WATER LEVEL

CAPE COD TEST BORING **BORING NO. HW - I**

Cape Cod Test Boring	Project	Boring No. HW-I (d)
5 Rayber Road, Orleans, MA 02653	Horsley Witten Group	
(508) 240-1000	Barnstable, 480 Barnstable Road	Sheet 1 of 1
div. Desmond Well Drilling, Inc.	Hyannis, MA	

Driller: Tommy Desmond	Boring location: Behind deployment (41.66662, -70.27212)	
Helper: Sean Morgan	Ground Surface Elevation:	
Inspector: Josephine Ibanez	Date start: 5/16/2019	Date end: 5/16/2019
Sampler consists of a two inch split spoon driven using a 140 lb. hammer falling thirty inches	Notes:	Auger Size: 6 1/4" x 4" H.S.A Casing Size: 2"x36.5' SCH40 PVC FJT Screen Size: 2"x5'X.010 SCH40 PVC FJT

Depth	Sample			Sample Description	Well Installation
(FT)	NO	PEN/REC	DEPTH/FT		
2					
0					
-2					
-4					
-6					
-8					
-10					
-12					
-14					
-16					
-18					
-20					
-22					
-24					
-26					
-28	1	24/20	27 - 29	F-M-C light brown sand; trace gravel. Wet.	
-30					
-32	2	24/24	32 -34	F-M-C light brown sand. Wet.	
-34					
-36					
-38	3	24/11	37 - 39	F-M-C light gray sand; trace gravel. Wet.	
-40					
-42	4	24/15	42 - 44	F-M-C brown sand; trace red sand; trace clay. Wet.	
-44					
-46					
-48					
-50					
-52					
?					
-57					
-62					
-67					
-72					



Not to scale
Well Depth: 41.5'
Static: 15.45'
Well screen: 36.1' to 41.5'
Grout: 3' to 27'
Bentonite seal: 27' to 30'
Sand pack: 30' to 41.5'
End of boring: 42'
End of sample: 44'

Granular Soils		Cohesive Soils		Proportions Used
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0 - 4	V. LOOSE	> 2	V. SOFT	Trace 0 - 10%
4 - 10	LOOSE	2 - 4	SOFT	Little 10 - 20%
10 - 30	M. DENSE	4 - 8	M. STIFF	Some 20 - 35%
30 - 50	DENSE	8 - 15	STIFF	And 35 - 50%
> 50	V. DENSE	15 - 30	V. STIFF	
		> 30	HARD	

Well Installation Key
- CONCRETE
- SAND PACK
- GROUT
- BENTONITE
- SCREEN
- APPROX. WATER LEVEL

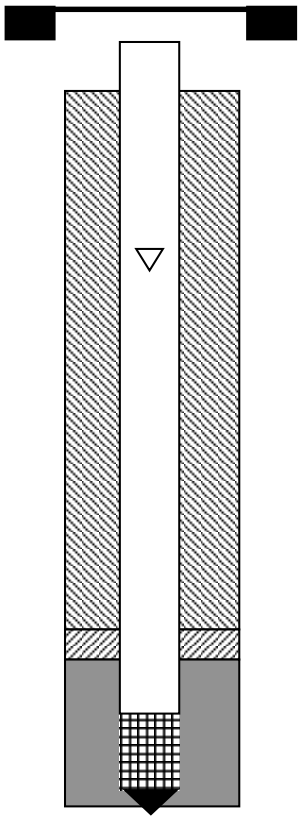
CAPE COD TEST BORING **BORING NO. HW-I (d)**

Cape Cod Test Boring	Project	Boring No. HW-I (m)
5 Rayber Road, Orleans, MA 02653	Horsley Witten Group	
(508) 240-1000	Barnstable, 480 Barnstable Road	Sheet 1 of 1
div. Desmond Well Drilling, Inc.	Hyannis, MA	

Driller: Tommy Desmond	Boring location: Behind deployment (41.66662, -70.27212)	
Helper: Sean Morgan	Ground Surface Elevation:	
Inspector: Josephine Ibanez	Date start: 5/16/2019	Date end: 5/16/2019

Sampler consists of a two inch split spoon driven using a 140 lb. hammer falling thirty inches	Notes:	Auger Size: 6 1/4" x 4" H.S.A Casing Size: 2"x30' SCH40 PVC FJT Screen Size: 2"x5'X.010 SCH40 PVC FJT

Depth	Sample			Sample Description	Well Installation
(FT)	NO	PEN/REC	DEPTH/FT		
2					
0			0 - 35	F-M-C light brown sand; trace gravel.	
-2					
-4					
-6					
-8					
-10					
-12					
-14					
-16					
-18					
-20					
-22					
-24					
-26					
-28					
-30					
-32					
-34					
-36					
-38					
-40					
-42					
-44					
-46					
-48					
-50					
-52					
?					
-57					
-62					
-67					
-72					



Not to scale
Well Depth: 35'
Static: 16.4'
Well screen: 30' to 35'
Grout: 3' to 27'
Bentonite seal: 27' to 30'
Sand pack: 30' to 35'
End of boring: N/A
End of sample: N/A

Granular Soils		Cohesive Soils		Proportions Used
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0 - 4	V. LOOSE	> 2	V. SOFT	Trace 0 - 10%
4 - 10	LOOSE	2 - 4	SOFT	Little 10 - 20%
10 - 30	M. DENSE	4 - 8	M. STIFF	Some 20 - 35%
30 - 50	DENSE	8 - 15	STIFF	And 35 - 50%
> 50	V. DENSE	15 - 30	V. STIFF	
		> 30	HARD	

Well Installation Key
- CONCRETE
- SAND PACK
- GROUT
- BENTONITE
- SCREEN
- APPROX. WATER LEVEL

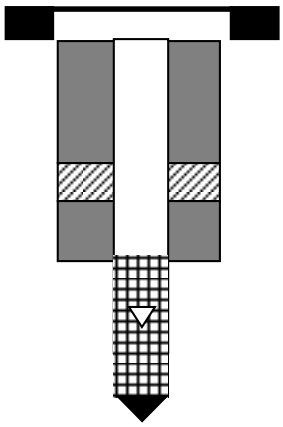
CAPE COD TEST BORING	**BORING NO.**	**HW-I (m)**

Cape Cod Test Boring	Project	Boring No. HW - J
5 Rayber Road, Orleans, MA 02653	Horsley Witten Group	
(508) 240-1000	Barnstable, 480 Barnstable Road	Sheet 1 of 1
div. Desmond Well Drilling, Inc.	Hyannis, MA	

Driller: Tommy Desmond	Boring location:
Helper: Sean Morgan	Ground Surface Elevation:
Inspector: Josephine Ibanez	Date start: 10/4/2018 Date end: 10/4/2018

Direct push sampler consists of 4' x 2 3/8" G3 dual tube direct push steel tooling with 4' x 1 1/2" PVC liner with 201 ft lb hydraulic hammer (percussion rate 2200 bpm)

Auger Size: 6 1/4" x 4" H.S.A
Casing Size: 2"x___' SCH40 PVC FJT
Screen Size: 2"x___'X.010 SCH40 PVC FJT

Depth	Sample				Sample Description	Well Installation
(FT)	NO	PEN/REC	DEPTH/FT	BLOWS 6"		
2						
0	1	N/R	0 - 4	N/R	Loamy; F-M brown sand; F-M-C	
-2					brown sand; trace F gravel. Dry.	
-4	2		4 - 8		F-M-C brown sand. Dry.	
-6						
-8	3		8 - 12		F-M-C brown sand;	
-10					trace F gravel (lense). Dry.	
-12	4		12 - 16		F-M-C brown sand; trace F-M	
-14					gravel. Dry.	
-16	5		16 - 20		F-M-C brown sand; little F-M	
-18					gravel. Wet.	
-20	6		20 - 24		F-M-C brown sand. Wet.	
-22						
-24	7		24 - 28		F-M-C brown sand. Wet.	
-26						
-28						
-30						
-32						
-34						
-36						
-38						
-40						
-42						
-44						
-46						
-48						
-50						
-52						Well Depth: 24.35'
-54						Static: 19.56'
-56						Well screen: 14.35' to 24.35'
-58						Sand pack: 0' to 10'
-60						Bentonite seal: 10' to 12'
-62						Sand pack: 12' to 14.35'
-64						End of boring: 24'
-66						End of sample: 28'

Granular Soils		Cohesive Soils		Proportions Used	Well Installation Key
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY		
0 - 4	V. LOOSE	> 2	V. SOFT	Trace 0 - 10%	- CONCRETE
4 - 10	LOOSE	2 - 4	SOFT	Little 10 - 20%	- SAND PACK
10 - 30	M. DENSE	4 - 8	M. STIFF	Some 20 - 35%	Z - SOIL BACKFILL
30 - 50	DENSE	8 - 15	STIFF	And 35 - 50%	- BENTONITE
> 50	V. DENSE	15 - 30	V. STIFF		- SCREEN
		> 30	HARD		- APPROX. WATER LEVEL

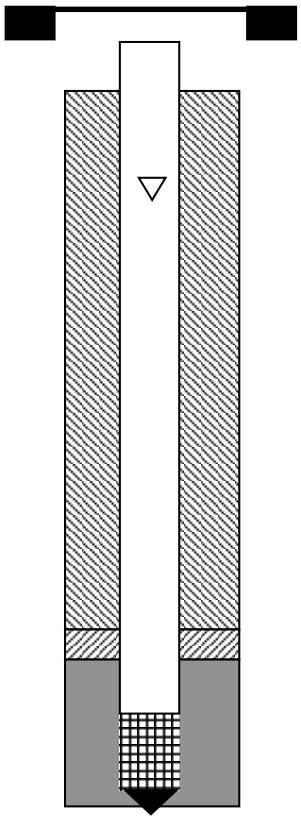
CAPE COD TEST BORING **BORING NO. HW - J**

Cape Cod Test Boring 5 Rayber Road, Orleans, MA 02653 (508) 240-1000 div. Desmond Well Drilling, Inc.	Project Horsley Witten Group Barnstable, 480 Barnstable Road Hyannis, MA	Boring No. HW-K Sheet 1 of 1

Driller: Tommy Desmond Helper: Sean Morgan Inspector: Josephine Ibanez	Boring location: Back of parking lot off site (41.66284, -70.27542) Ground Surface Elevation: Date start: 5/31/2019	Date end: 6/3/2019
Sampler consists of a two inch split spoon driven using a 140 lb. hammer falling thirty inches	Notes:	Auger Size: 6 1/4" x 4" H.S.A Casing Size: 2"x39' SCH40 PVC FJT Screen Size: 2"x5'X.010 SCH40 PVC FJT

Depth	Sample			Sample Description
(FT)	NO	PEN/REC	DEPTH/FT	
2				
0				
-2				
-4				
-6	1	24/24	5 - 7	F-M-C brown sand; some gravel; some cobble. Dry.
-8	2	24/10	7 - 9	F-M-C brown sand; trace cobble; trace gravel. Dry.
-10				
-12	3	24/15	12 - 14	F-M-C brown sand; trace gravel. Dry.
-14				
-16				
-18	4	24/15	17 - 19	F-M-C light brown sand; trace gravel. Dry.
-20				
-22	5	24/15	22 - 24	F-M brown sand; trace silt. Wet at 22 ft.
-24				
-26				
-28	6	24/8	27 - 29	F-M brown silty sand. Wet.
-30				
-32	7	24/9	32 -34	F-M-C brown sand; trace silt. Wet.
-34				
-36				
-38	8	24/9	37 - 39	F-M-C brown silty sand; trace gravel. Wet.
-40				
-42	9	24/12	42 - 44	F-M-C brown sand; M-C brown/black sand. Wet.
-44				
-46				
-48				
-50				
-52				
?				
-57				
-62				
-67				
-72				

Well Installation



Not to scale
Well Depth: 44'
Static: 19.7'
Well screen: 39' to 44'
Grout: 3' to 34'
Bentonite seal: 34' to 36'
Sand pack: 36' to 44'
End of boring: 44'
End of sample: 44'

Granular Soils		Cohesive Soils		Proportions Used
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0 - 4	V. LOOSE	> 2	V. SOFT	Trace 0 - 10%
4 - 10	LOOSE	2 - 4	SOFT	Little 10 - 20%
10 - 30	M. DENSE	4 - 8	M. STIFF	Some 20 - 35%
30 - 50	DENSE	8 - 15	STIFF	And 35 - 50%
> 50	V. DENSE	15 - 30	V. STIFF	
		> 30	HARD	

Well Installation Key
- CONCRETE
- SAND PACK
- GROUT
- BENTONITE
- SCREEN
- APPROX. WATER LEVEL

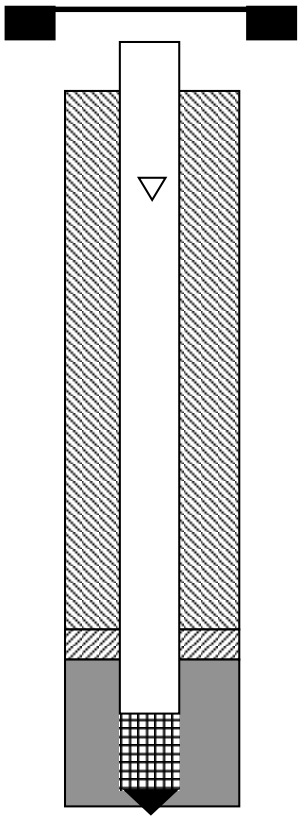
CAPE COD TEST BORING	**BORING NO.**	**HW-3(m)**

Cape Cod Test Boring	Project	Boring No. HW-L(d)
5 Rayber Road, Orleans, MA 02653	Horsley Witten Group	
(508) 240-1000	Barnstable, 480 Barnstable Road	Sheet 1 of 1
div. Desmond Well Drilling, Inc.	Hyannis, MA	

Driller: Tommy Desmond	Boring location: End of runway 33 (41.66329, -70.27865)	
Helper: Sean Morgan	Ground Surface Elevation:	
Inspector: Josephine Ibanez	Date start: 5/13/2019	Date end: 5/13/2019
Sampler consists of a two inch split spoon driven using a 140 lb. hammer falling thirty inches	Notes:	Auger Size: 6 1/4" x 4" H.S.A Casing Size: 2"x65.4' SCH40 PVC FJT Screen Size: 2"x5'X.010 SCH40 PVC FJT

Depth	Sample			Sample Description
(FT)	NO	PEN/REC	DEPTH/FT	
2				
0	1	24/8	0 - 2	F-M-C brown sand; trace gravel. Dry.
-2	2	24/13	2 - 4	F-M-C brown sand; trace gravel. Dry.
-4				
-6				
-8	3	24/12	7 - 9	F-M-C light brown sand; trace gravel. Dry.
-10				
-12	4	24/8	12 - 14	F-M-C brown sand; some gravel. Dry.
-14				
-16				
-18	5	24/14	17 - 19	F-M-C light brown sand; trace gravel. Dry.
-20				
-22	6	24/12	22 - 24	F-M-C light brown sand. Wet.
-24				
-26				
-28	7	24/15	27 - 29	F-M-C light brown sand; trace gravel. Wet.
-30				
-32	8	24/19	32 -34	F-M-C light brown sand; trace gravel. Wet.
-34				
-36				
-38	9	24/24	37 - 39	F-M-C light brown sand; trace gravel. Wet.
-40				
-42	10	24/19	42 - 44	F-M-C light brown sand; little gravel. Wet.
-44				
-46				
-48	11	24/15	47 - 49	F-M-C light brown sand; little gravel. Wet.
-50				
-52	12	24/24	52 - 54	F-M-C light brown sand; little gravel. Wet.
?				
-57	13	24/12	57 - 59	F-M brown sand. Wet.
-62	14	24/15	62 - 64	F-M light brown sand. Wet.
-67	15	24/20	67 - 69	F-M brown sand. Wet.
-72	16	24/13	72 - 74	F gray clay. Wet.

Well Installation



Not to scale

Well Depth: 70.4'
Static: 19'
Well screen: 65.4' to 70.4'
Grout: 3' to 60'
Bentonite seal: 60' to 62'
Sand pack: 62' to 70.4'
End of boring: 72'
End of sample: 74'

Granular Soils		Cohesive Soils		Proportions Used
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0 - 4	V. LOOSE	> 2	V. SOFT	Trace 0 - 10%
4 - 10	LOOSE	2 - 4	SOFT	Little 10 - 20%
10 - 30	M. DENSE	4 - 8	M. STIFF	Some 20 - 35%
30 - 50	DENSE	8 - 15	STIFF	And 35 - 50%
> 50	V. DENSE	15 - 30	V. STIFF	
		> 30	HARD	

Well Installation Key
- CONCRETE
- SAND PACK
- GROUT
- BENTONITE
- SCREEN
- APPROX. WATER LEVEL

CAPE COD TEST BORING **BORING NO. HW-L**

8 O^SÃ]RÃ SabÃ]` \WU . ÃGOgPS`ÃG OR%ÃZSO\a°Ã 6Ã+/., #)1$ Ã-)&*))) RWÃ Sa[ ]\RÃL SZÃ `WZZÃÃG\	E`]XSOb =]`aZSgÃ. WSÃ<`]c^ 7O\abOPSZÃ1)Ã7O\abOPSÃG]OR =gO\\Wa°Ã 6	7]`\WUÃC]' =L &#B$ HVSSbÃÃ]T *
9`WZZS  I ][ [ gÃ Sa[ ]R =SZ`S`3  HSOWÃ]`UO\ >\a^SOb]`3 HO O/Ã O bZSbb	7]`\WUÃZ]OOb\W3  Gc\e Og#-*" //+00%Ã0)' +01-+$ <`]c\RÃHc`TOSÃZSdOb\W3 9 ObSÃaOb3Ã20(+)+) 9 ObSÃSR3Ã20(+)+)	
HO[^ZS ÃG]\ aWabaÃ]TÃÃDbeÃWO/ÃaZOÃ a^]]Ã R`WSVÃca\WUÃOÃ)Ã ZP Ã/O[ [ S`Ã TOZWUÃbWbgÃWO/Sa	C]bSa3Ã	6cUS`ÃHWS3ÃÃ(-ÃÃÃ ÃÃ=H'6 8 Oa\WUÃHWS3 +Ã,+' ,," ÃH8 = -)ÃEK8 Ã,?I HO SS\ÃHWS3 +Ã." M)*)Ã H8 = -)ÃEK8 Ã,?I

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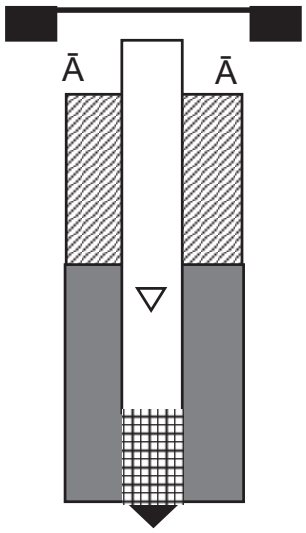

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9`WZZS I ][ [ gÃ Sa[ ]R =SZ`S`3 HSOWÃ]`UO\ >\a^SOb]`3 HO OÃ/Ã O bZSbb	7]`\WUÃZ]OOb\W3 Gc\e Og#+*' //+00%Ã0)' +01-+$ <`]c\RÃHc`TOOSÃZSdOb\W3 9 ObSÃaOb3Ã20(+)+) 9 ObSÃSR3Ã20(+)+)	
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9 S^bV	HO[^ZS				HO[^ZSa SaQWbW\	L SZZaÃabOZZbQW\
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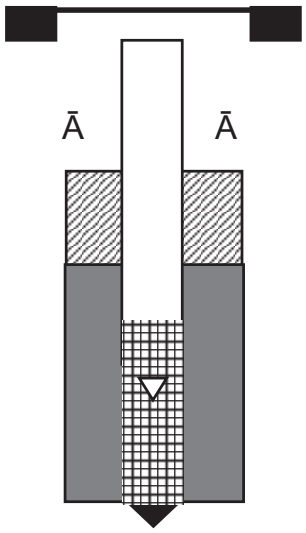

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L SZZaQ SS\3Ã0' ,," Ãj Ã+0',,"
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-Ã&Ã)	ADDH:	+Ã&-	HD; I	AWSÃ)Ã&+)	&HD>AÃ768 @;>AA
*)Ã&Ã)	B'Ã9: CH:	- Ã&Ã1	B'ÃHI >;;	H][SÃ+)Ã&Ã	&7: CID C>I:
,)Ã&Ã)	9: CH:	1Ã&Ã.	HI >;;	6\RÃÃÃÃ)	&H8 G::C
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Cape Cod Test Boring	Project	Boring No. HW-M
5 Rayber Road, Orleans, MA 02653	Horsley Witten Group	
(508) 240-1000	Barnstable, 480 Barnstable Road	Sheet 1 of 1
div. Desmond Well Drilling, Inc.	Hyannis, MA	

Driller: Tommy Desmond	Boring location: Cit Ave and Plant Road (41.67157, -70.29359)
Helper: Sean Morgan	Ground Surface Elevation:
Inspector: Josephine Ibanez	Date start: 5/30/2019 Date end: 5/30/2019

Direct push sampler consists of 4' x 2 3/8" G3 dual tube direct push steel tooling with 4' x 1 1/2" PVC liner with 201 ft lb hydraulic hammer (percussion rate 2200 bpm)

Auger Size: 6 1/4" x 4" H.S.A
Casing Size: 2"x16.9' SCH40 PVC FJT
Screen Size: 2"x10'X.010 SCH40 PVC FJT

Depth	Sample				Sample Description	Well Installation
(FT)	NO	PEN/REC	DEPTH/FT	BLOWS 6"		
2						
0			0 - 5		Vacuum truck.	
-2						
-4	1		5 - 8		F-M-C brown sand and gravel.	
-6					Dry.	
-8	2		8 - 12		F-M-C brown sand and gravel.	
-10					Dry.	
-12	3		12 - 16		F-M-C brown sand and gravel.	
-14					Dry.	
-16	4		16 - 20		F-M-C brown sand and gravel.	
-18					Dry.	
-20	5		20 - 24		F-M-C brown sand and gravel.	
-22					Wet.	
-24	6		24 - 28		F-M-C brown sand and gravel.	
-26					Wet.	
-28						
-30						
-32						
-34						
-36						
-38						
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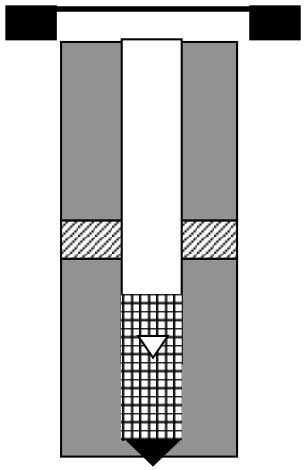

Well Depth: 26.90'
Static: 20.45'
Well screen: 16.9' to 26.9'
Native: 0' to 11'
Bentonite seal: 11' to 13'
Sand pack: 13' to 20.45'
End of boring: 28'
End of sample: 28'

Granular Soils		Cohesive Soils	
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY
0 - 4	V. LOOSE	> 2	V. SOFT
4 - 10	LOOSE	2 - 4	SOFT
10 - 30	M. DENSE	4 - 8	M. STIFF
30 - 50	DENSE	8 - 15	STIFF
> 50	V. DENSE	15 - 30	V. STIFF
		> 30	HARD

Proportions Used

Trace 0 - 10%
Little 10 - 20%
Some 20 - 35%
And 35 - 50%

Well Installation Key

- CONCRETE
- SAND PACK
- SOIL BACKFILL
- BENTONITE
- SCREEN
- APPROX. WATER LEVEL

CAPE COD TEST BORING **BORING NO. HW-M**

Cape Cod Test Boring	Project	Boring No. HW-N
5 Rayber Road, Orleans, MA 02653	Horsley Witten Group	
(508) 240-1000	Barnstable, 480 Barnstable Road	Sheet 1 of 1
div. Desmond Well Drilling, Inc.	Hyannis, MA	

Driller: Tommy Desmond	Boring location: Attucks Lane (41.67372, -70.29490)
Helper: Sean Morgan	Ground Surface Elevation:
Inspector: Josephine Ibanez	Date start: 5/31/2019 Date end: 5/31/2019

Direct push sampler consists of 4' x 2 3/8" G3 dual tube direct push steel tooling with 4' x 1 1/2" PVC liner with 201 ft lb hydraulic hammer (percussion rate 2200 bpm)

Auger Size: 6 1/4" x 4" H.S.A
Casing Size: 2"x16.9' SCH40 PVC FJT
Screen Size: 2"x10'X.010 SCH40 PVC FJT

Depth	Sample				Sample Description	Well Installation
(FT)	NO	PEN/REC	DEPTH/FT	BLOWS 6"		
2						
0			0 - 5		Vacuum truck.	
-2						
-4	1		5 - 8		F-M-C brown sand and gravel.	
-6					Dry.	
-8	2		8 - 12		F-M-C brown sand and gravel.	
-10					Dry.	
-12	3		12 - 16		F-M-C brown sand and gravel.	
-14					Wet.	
-16	4		16 - 20		F-M-C brown sand and gravel.	
-18					Wet.	
-20	5		20 - 24		F-M-C brown sand and gravel.	
-22					Wet.	
-24						
-26						
-28						
-30						
-32						
-34						
-36						
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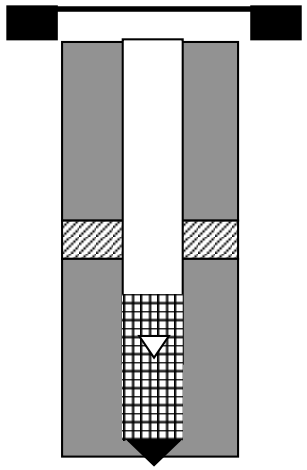
-40						
-42						
-44						
-46						
-48						
-50						
-52						Well Depth: 22.3'
-54						Static: 15.48'
-56						Well screen: 12.3' to 22.3'
-58						Native: 0' to 7'
-60						Bentonite seal: 7' to 9'
-62						Sand pack: 9' to 22.3'
-64						End of boring: 24'
-66						End of sample: 24'



Granular Soils		Cohesive Soils		Proportions Used
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0 - 4	V. LOOSE	> 2	V. SOFT	Trace 0 - 10%
4 - 10	LOOSE	2 - 4	SOFT	Little 10 - 20%
10 - 30	M. DENSE	4 - 8	M. STIFF	Some 20 - 35%
30 - 50	DENSE	8 - 15	STIFF	And 35 - 50%
> 50	V. DENSE	15 - 30	V. STIFF	
		> 30	HARD	

Well Installation Key
- CONCRETE
- SAND PACK
- SOIL BACKFILL
- BENTONITE
- SCREEN
- APPROX. WATER LEVEL

CAPE COD TEST BORING **BORING NO. HW-N**

Cape Cod Test Boring	Project	Boring No. HW-O
5 Rayber Road, Orleans, MA 02653	Horsley Witten Group	
(508) 240-1000	Barnstable, 480 Barnstable Road	Sheet 1 of 1
div. Desmond Well Drilling, Inc.	Hyannis, MA	

Driller: Tommy Desmond	Boring location: Airport Road (41.67054, -70.29819)
Helper: Sean Morgan	Ground Surface Elevation:
Inspector: Josephine Ibanez	Date start: 5/31/2019 Date end: 5/31/2019

Direct push sampler consists of 4' x 2 3/8" G3 dual tube direct push steel tooling with 4' x 1 1/2" PVC liner with 201 ft lb hydraulic hammer (percussion rate 2200 bpm)

Auger Size: 6 1/4" x 4" H.S.A
Casing Size: 2"x16.9' SCH40 PVC FJT
Screen Size: 2"x10'X.010 SCH40 PVC FJT

Depth	Sample				Sample Description	Well Installation
(FT)	NO	PEN/REC	DEPTH/FT	BLOWS 6"		
2						
0			0 - 5		Vacuum truck.	
-2						
-4	1		5 - 8		F-M-C brown sand and gravel.	
-6					Wet.	
-8	2		8 - 12		F-M-C brown sand and gravel.	
-10					Wet.	
-12	3		12 - 16		F-M-C brown sand and gravel.	
-14					Wet.	
-16	4		16 - 20		F-M-C brown sand and gravel.	
-18					Wet.	
-20						
-22						
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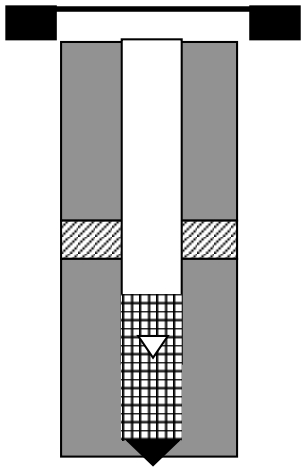

Well Depth: 14'
Static: 1.8'
Well screen: 4' to 14'
Native: 0' to 1'
Bentonite seal: 1' to 3'
Sand pack: 3' to 14'
End of boring: 20'
End of sample: 20'

Granular Soils		Cohesive Soils	
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY
0 - 4	V. LOOSE	> 2	V. SOFT
4 - 10	LOOSE	2 - 4	SOFT
10 - 30	M. DENSE	4 - 8	M. STIFF
30 - 50	DENSE	8 - 15	STIFF
> 50	V. DENSE	15 - 30	V. STIFF
		> 30	HARD

Proportions Used

Trace 0 - 10%
Little 10 - 20%
Some 20 - 35%
And 35 - 50%

Well Installation Key

- CONCRETE
- SAND PACK
- SOIL BACKFILL
- BENTONITE
- SCREEN
- APPROX. WATER LEVEL

CAPE COD TEST BORING **BORING NO. HW-O**

8 O^SÃ]RÃ SabÃ]` \WU . ÃGOgPS`ÃG OR%ÃZSO\a%Ã8 6Ã+/., #)1$ Ã+-)&*))) RWÃ Sa[ ]\RÃL SZÃ `WZZ%ÃG\	E`]XSOb =]`aZSgÃL WbSÃ<`]c^ 7O\abOPSZ%Ã1)Ã7O\abOPSZÃG]OR =gO\\W%Ã8 6	7]`\WUÃC]' =L &E#B$ HVSSbÃÃ]T *
9`WZZS I ][ [ gÃ Sa[ ]\R =SZ`S`3 HSOWÃ8]`UO\ >\a^SOb]`3 HO`OV/Ã`O bZSbb	7]`\WUÃZ]OOb\W3 9S^Zg[ S\bÃO`SOÃ*" //-.1% Ã0)' +00+)$ <`]c\RÃHc`TOOSÃZSdOb\W8 9ObSÃaOb3Ã21(+)+) 9ObSÃSR3Ã21(+)+)	
HO[^ZS`ÃG\ a\abaÃ]TÃÃOb¢ÃW\Q\/ÃaZOÃ a^]]ÃR`WbS\Ãca\WUÃOÃ)ÃZP`Ã/O[ [ S`Ã TOZW\UÃbWbgÃW\Q\/Sa	C]bSa3Ã	6cUS`ÃHWS3ÃÃ{-ÃÃÃÃ=H'6 8 Oa\WUÃHWS3 +Ã,,' ,"Ã8 = -)ÃEK8Ã,?I HO[SS\ÃHWS3 +Ã." M)*)Ã H8 = -)ÃEK8Ã,?I

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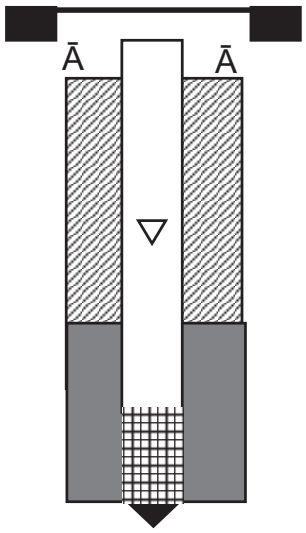

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7S\b]\WbSÃU]cbÃe 3Ã1"ÃbÃ,+"
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*)Ã&Ã)	B'Ã9: CH:	-Ã&Ã1	B'ÃHI >;;	H][SÃ+)Ã&Ã,	&7: CID C>I:
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8 O^SÃ]RÃ SabÃ]` \WU . ÃGQgPS`ÃG¡OR%ÃDSO\a°Ã8 6Ã+/., #)1$ Ã+-)&*))) RdWÃ Sa[ ]\RÃL SZÃ `WZDÃQÃ3\	E`]XSQb =]`aZSgÃ. WbSÃ<`]c^ 7O\abOPSZÃ1)Ã7O\abOPSÃG]OR =gO\\Wa°Ã8 6	7]`\WUÃC]' =L &E#H$ HVSSbÃÃ]T *
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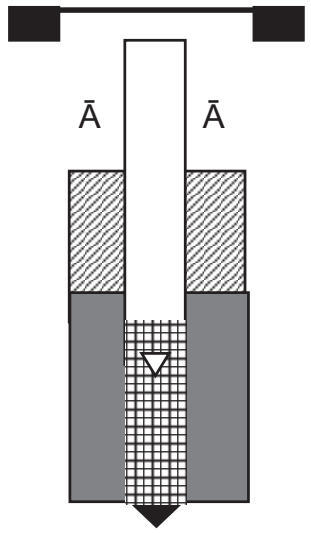

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7S\b]\WbSÃU cb3Ã*"ÃbÃ*-"
7S\b]\WbSÃU cbÃ e 3Ã(O
HO RÃ^OQ\3Ã-"Ã Ã+0"
:\RÃTÃP]`\WUÃ+2"
:\RÃTÃQ[^ZS3ÃÃ0

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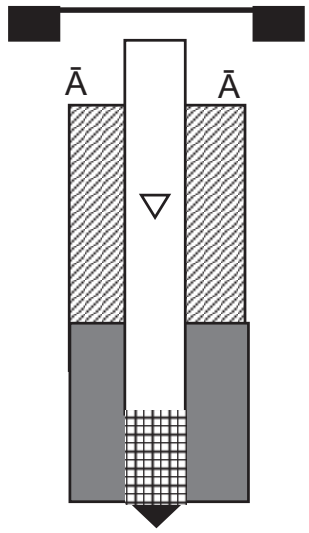

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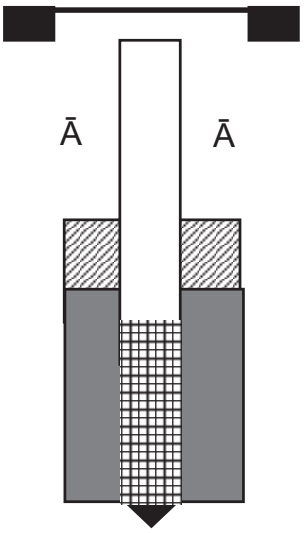
+					9 `WZSRÃ\WÃ]ZZ[e ÃabS[ÃQcUSàÃj Ã+1" O\RÃSbÃe SZÃOaÃRV\SQbSR'	 *Not to scale* L SZÃ S^bVÃ/ /" HbOhWÃ*" -." L SZÃaQ SS\3Ã/ /" Ãj Ã+/ /" COhW83Ã Ãb*) " 7S\h] \ WSÃU cb3Ã *"Ãb*; " 7S\h] \ WSÃU cbÃ e 3Ã(O HO RÃ^OQ3Ã," Ãj Ã+/" : \ RÃTÃP]` \WUÃ+1" : \ RÃTÃaO[^ZSÃ(O
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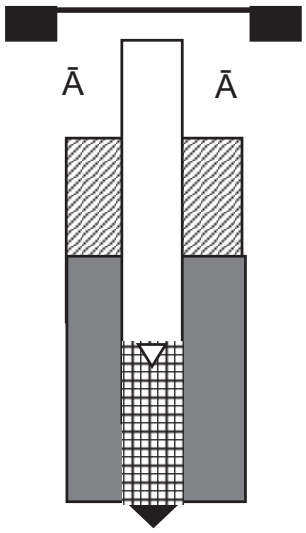

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COb W83Ã)Ãb."
7S\b] \ WSÃU] cb3ÃÃbÃ2
7S\b] \ WSÃU] cbÃJe 3Ã(O
HO RÃ^OQY3Z"Ã¡Ã+,' ./"
: \ R¡TÃP]` \WUÃ+."
: \ R¡TÃaO[^ZSÃ+)"

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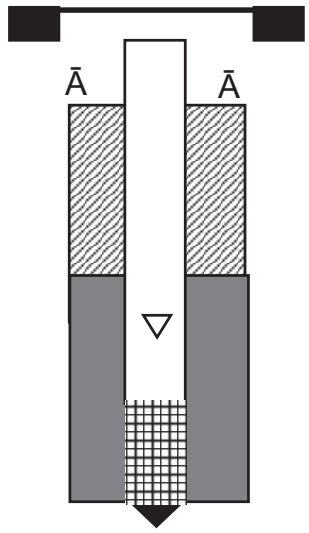

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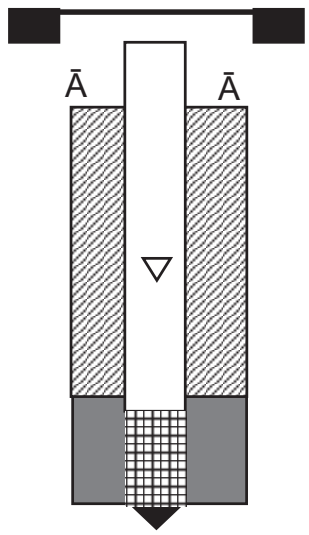

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L SZZÃ9 S^bV/Ã,Ã/' *."
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L SZZÃaQ SS\3Ã*' *." Ã4,Ã,Ã/' *."
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7S\b]\WbSÃU]cb3ÃÃbÃ+e"
7S\b]\WbSÃU]cbÃ4e 3Ã0"ÃbÃ,Ã,)"
HO RÃ^OQ/3Ã,)" Ã4,Ã,"
:\RÃTÃÃP]`\WUÃ,Ã/"
:\RÃTÃaO[^ZSÃ,Ã"

< `O\cZO`Ã+]WZa		8]VSa\WSÃ+] \Wa		E`]^]` bWa Ã aSR	L SZZÃ>abQZZbWÃ@g
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9` WZSS  I ] [ [ gÃ Sa[ ]R =SZ`S`3  HSO\Ã8 ] `UO\ >\a^SQb]`3 HO O\Ã7 O bZSbb	7] `\WUÃZ]QQbW\3  Gc\e Og#-*" //+00%Ã0)' +01-+$ < `]c\RÃHc` TQQSÃ ZSdQbW8 9 ObSÃ\aOb3Ã20(+) +) 9 ObSÃ\R3Ã2(*0(+)+)	

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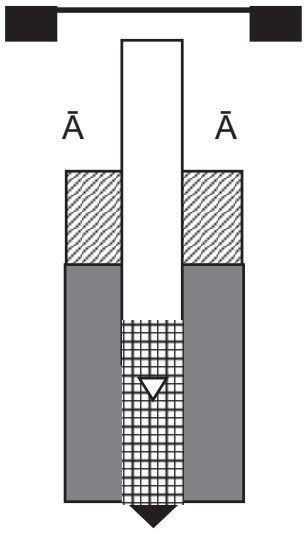

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L SZ Ã9 S^bV Ã-0',,"
HbOb QÃ-*" 2/"
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CQbW8ÃPQ Y TZ Ã"Ãb]*) "
7S\b]\W8ÃSQ Ã\)" Ãj Ã-"
HO RÃ\QQ Y3Ã*"Ãb]-0"
: \R TÃP]` \WUÃ-1"
: \R TÃ[^ZS3Ã\O

< `O\cZO`Ã-]W Za		8]VSa\W8Ã] \Wa		E`]^\` b]Wa Ã aSR	L SZ ÃaQ Z Q]W\ ÃG8g
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-Ã&Ã)	ADDH:	+Ã&-	HD; I	A\W8ZÃ *Ã&Ã+)	Ã &HD>AÃ768 @;>AA
*) Ã&,)	B 'Ã9: CH:	- Ã&Ã1	B 'ÃHI >; ;	H] [SÃ+)Ã&Ã	&7: CID C>I:
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8 O^SÃ]RÃ SabÃ]` \WU . ÃG gPS`ÃG OR%ÃZSO\a°Ã8 6Ã+/., #)1$ Ã-)&*))) RWÃ Sa[ ] \ RÃ SZ ÃWZ ÃG\	E` ] XSQb = ] `aZSgÃ WS\Ã< `]c^ 7O\ abOPSÃ1)Ã7 O\a bOPSÃG] OR = gO\ \ Ã°%ÃB	7] `\WUÃC] ' = L &#B$ HVSSbÃ]T *

9` WZSS =SZ`S`3 >\a^SQb]`3	I] [[gÃ Sa[ ]R HSO\Ã8] `UO\ HO O/Ã O bZSbb	7] `\WUÃZ]QQbW\3 Gc\e Og#-*' //+00%Ã0)' +01-+$ < `]c\RÃHc` TQQSÃ ZSdQbW8 9 ObSÃ\aOb3Ã20(+) +) 9 ObSÃ\R3Ã2(*0(+)+)

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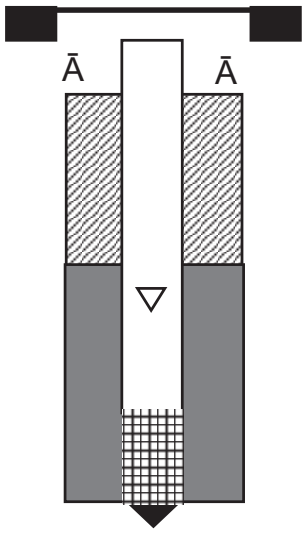

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7S\b]\WbSÃSOZÃ"Ã,Ã-1"
7S\b]\WbSÃU]cbÃaZ[e 3Ã-1"Ã,Ã+"
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: \RÃ,TÃG[^ZS3Ã\O

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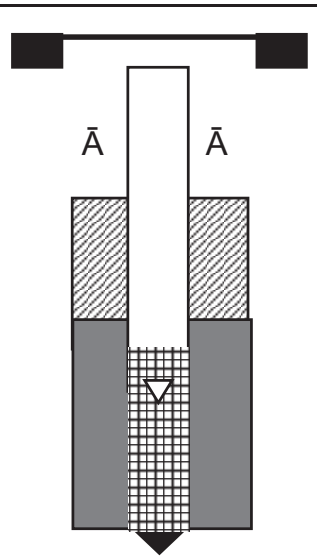

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COWÃ3Ã Ãb Ã*) "
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7S\b \ WS Ã] cbÃ e 3Ã O
HO RÃ*OQ Y3Ã*"Ãb Ã+0"
: \RÃ TÃP] ` \WUÃ+2"
: \RÃ TÃQ ^ZS3ÃÃ0

< `O\cZO`Ã+]WZa		8]VSa\WS Ã] \Wa		E` ]^]` bW Ã aSR	L SZÃÃabQZ ZQW\ ÃQSg
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*) ÃÃ,)	B 'Ã9: CH:	- Ã&Ã1	B 'ÃHI >; ;	H] [SÃ+)Ã&Ã	&7: CID C>I:
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8 O^SÃ]RÃ SabÃ]` \WU . ÃG OgPS`ÃG OR%ÃZSO\a°Ã8 6Ã+/., #)1$ Ã+-)&*))) RWÃ Sa[ ]\RÃ SZ ÃWZ ÃG\	E`]XSOb =]`aZSgÃ WS\Ã<`]c^ 7O\abOPSÃG]OR =gO\\a%ÃB	7]`\WUÃC]' =L &E#B$ HVSSbÃÃ]T *

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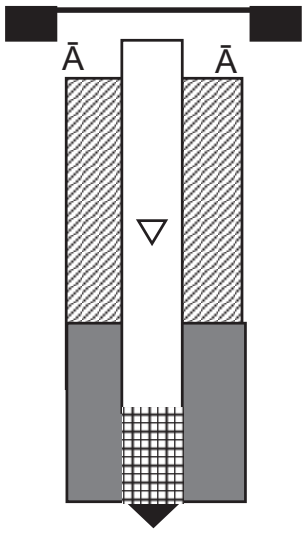

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L SZ Ã aO\SS\3Ã,' ,"Ã ,Ã1',"
CObW3Ã Ã.."
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7S\b]\WS Ã U]cb ÃZe3Ã+1"Ã ,Ã+"
HO RÃ OQY3Ã+"ÃbÃ,1"
:\RÃTÃP]`\WUÃ1"
:\RÃTÃaO[^ZS Ã)"

<`OZO`Ã+]WZa		8]VSa\WS Ã]WZa		E`]^]` bWa Ã aSR	L SZ Ã abOZ ZbW\ ÃGSg
7ADL H(;I	9: CH>N	7ADL H(;I	9: CH>N		&8 DC8G: I:
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-Ã&Ã)	ADDH:	+Ã&-	HD; I	AWSZÃ*Ã&Ã+)	Ã &HD>AÃ768 @;>AA
*)Ã&Ã,)	B'Ã9: CH:	-Ã&Ã1	B'ÃHI>;;	H][SÃ+)Ã&Ã,	&7: CID C>I:
,)Ã&Ã.)	9: CH:	1Ã&Ã.	HI>;;	6\RÃÃÃÃ&Ã)	&H8 G::C
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8 O^SÃ]RÃ SabÃ]` \WU . ÃG¤gPS`ÃG¦OR%ÃŒSO\a°Ã8 6Ã+/., #)1$ Ã+-)&*))) RÃ Sa[ ] \ RÃ SZŒÃWZŒ%ÃG\	E`] XSQb =] `aŽSgÃ WÃS\Ã< `]c^ 7O\ abOPSŽ%Ã1)Ã7 O\a bOPSÃG] OR =gO\ \ Ã°%ÃB	7] `\WUÃC] ' =L &F#H$ HVSSbÃÃ]T *
9` WZŽS  I ] [ [ gÃ Sa[ ]R =SZ`S`3  HSO\Ã8 ] `UO\ >\a^SQb]`3 HO\O\/Ã7 O bŽSbb	7] `\WUÃŽ]QQbW\3  EO`Y\WUÃ`SOÃ<- OSÃ8 Ã+*" //.)1% Ã0)' +0--)$ < `]c\RÃHc` TOQSÃ ŽSdOb\W8 9 ObSÃ\aOb3Ã2 (+) +) 9 ObSÃ\R3Ã2(*.(+)+)	
HQ[^ŽS ÃG] \ a\abaÃ]TÃÃOb¢Ã\WQ\/ÃÃ•ŽŒÃ a^]]ÃÃ R`\WS\Ãca\WUÃOÃ)Ã ŽP`Ã/O[[S`Ã TOŽZUÃ\W\bÃ\WQ\/Sa	C] bSa3Ã	6cUS`ÃHWS3ÃÃ\{- ÃÃÃ ÃÃ=H'6 8 Oa\WUÃHWS3 +Ã*/' /"Ã8 = -)ÃEK8 Ã ?I HQ SS\ÃHWS3 +Ã*)" M)*)Ã H8 = -)ÃEK8 Ã ?I

9 S^\bV	HQ[^ŽS				HQ[^ŽÃ SaQ W\bW\	L SŽŽÃ\abOŽZŒW\
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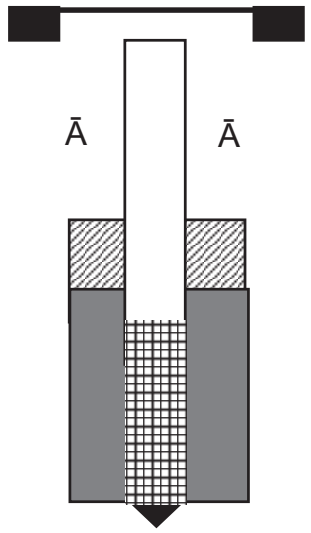

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L SŽŽÃ S^\bV/Ã+/' /"
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L SŽŽÃaQ SS\3Ã\/' /" Ã¦Ã+/' /"
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7S\b¦\W\SÃU]cb3Ã*)" Ã¦Ã,"
7S\b¦\ \ W\SÃU] cbÃ¦e 3Ã(O
HO RÃ(OQY3Ã,*"Ã\bÃ+"
: \RÃ¦TÃP]` \WUÃ+1"
: \ RÃ¦TÃG¦ ^ŽS3Ã(O

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*) Ã&Ã,)	B 'Ã9: CH:	- Ã&Ã1	B 'ÃHI >; ;	H]` [SÃ+)Ã&Ã,	&7: CID C>+:
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9` WZŽS  I ] [ [ gÃ Sa[ ]\R =SZ`S`3  HSO\Ã8 ] `UO\ >\a^SQb]`3 HO\O\/Ã7 O bŽSbb	7] `\WUÃŽ]QQb\W 3  EO`Y\WUÃ`SOÃ<- OSÃB Ã+*' //.)1% Ã0)' +0--)$ < `]c\RÃHc` TOQSÃ ŽSdOb\W8 9 ObSÃ\aOb3Ã2-(+) +) 9 ObSÃ\R3Ã2(*-(+)+)

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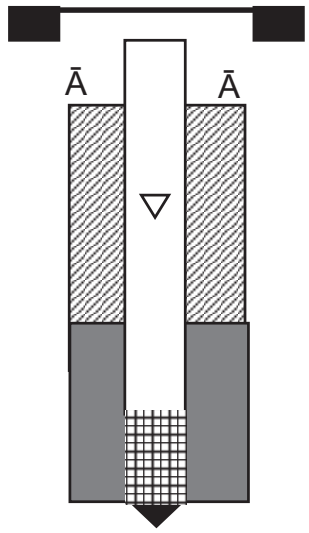

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7 S\bj]\WbSÃU]cbÃaZ e 3Ã+-"Ã\j Ã+0"
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: \RÃ]TÃaO[^ŽSÃ)"

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8 O^SÃ]RÃ SabÃ]` \WU . ÃG OgPS`ÃG OR%ÃZSO\a ÃB 6Ã+/., #)1$ Ã+-)&*))) RWÃ Sa[ ] \ RÃ SZ ÃWZ ÃÃ3\	E` ] XSOb = ] `aZSgÃ \WS\Ã< `]c^ 7O\ abOPSZÃ1)Ã7 O\a bOPSZÃG] OR = gO\ \ Ã%ÃB	7] `\WUÃC] ' = L &G#H$ HVSSbÃÃ]T *

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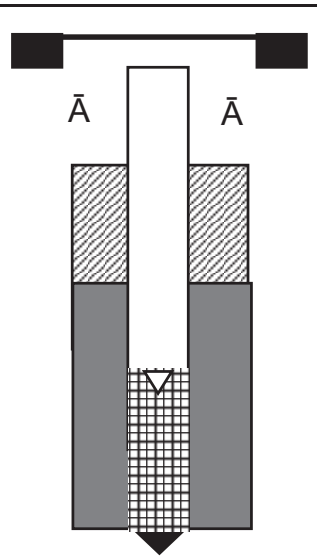

Not to scale

L SZZÃ9 S^\bV Ã+,' ./"
HbOb QÃ1' ,,"
L SZZÃaQ\SS\3Ã,' ./" Ã Ã+,' ./"
COb W3Ã Ã bÃ."
7S\b] \ \WSÃU] cb3ÃÃb Ã2
7S\b] \ \WSÃU] cbÃZge 3Ã(O
HO\ RÃ(OQY3Ã ZÃb Ã+'. / "
: \RÃ TÃP]` \WUZÃ+."
: \RÃ TÃaO[^ZSZÃ+)"

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8 O^SÃ]RÃ SabÃ]` \WU . ÃGOgPS`ÃG OR%ÃZSO\a°Ã8 6Ã+/., #)1$ Ã+-)&*))) RWÃ Sa[ ] \ RÃ SZ ÃWZ ÃO\	E`] XSOb = ] `aZSgÃ WS\Ã< `]c^ 7O\ abOPSÃ1)Ã7 O\a bOPSÃG] OR = gO\ \ Ã°%ÃB	7] `\WUÃC] ' = L &H#H$ HVSSbÃ]T *
9` WZS  I ] [ [ gÃ Sa[ ]R =SZ`S`3  HSOÃ ] `UO\ >\a^SOb]`3 HO O/Ã O bZSbb	7] `\WUÃ]OOb\ 3  ; S`\R]Q Ã+b'ÃÃDÃÃNO[ ] cb/ÃGRÃ#*'/ / . * * %Ã&+0* * +$ < `]c\RÃ Hc` TOOSÃ ZSdOb\8 9 ObSÃ aOb3Ã2 (+) +) 9 ObSÃ\R3Ã2(*/(+)+)	
HO[^ZS ÃG] \ aÃabaÃ]TÃÃDbÃ WQ/ÃÃ°ZOÃ a^]]ÃÃ R`WS\ÃcaWUÃOÃ)Ã ZP Ã/O[ [ S`Ã TOZ ZUÃ WbÃ WQ/Sa	C] bSa3Ã	6cUS`Ã+WS3ÃÃ\-ÃÃÃ ÃÃ=H'6 8 OaWUÃ+WS3 +Ã*+' * "Ã+8 = -)ÃEK8 Ã ?I HO SS\Ã+WS3 +Ã*)" M)*)Ã H8 = -)ÃEK8 Ã ?I

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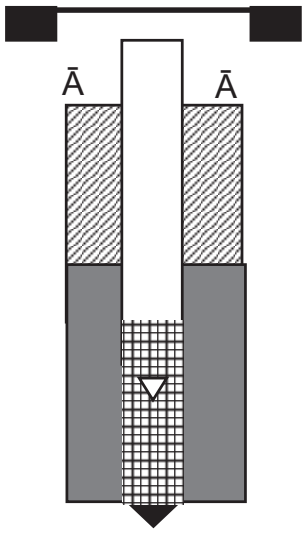

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: \RÃ TÃP]` \WUÃ+,"
: \RÃ TÃG[^ZS3Ã(O

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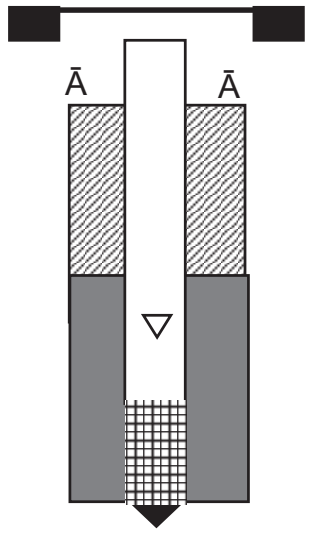

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L SZÃ9 S^bV Ã,+')-"
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HO\RÃOQ 3Ã+-" Ã Ã,+')-"
: \RÃTÃP]`\WUÃ"
: \RÃTÃaO[^ZS Ã"

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8 O^SÃ]RÃ SabÃ]` \WU . ÃG QgPS`ÃG OR%ÃZSO\a°Ã8 6Ã+/., #)1$ Ã-)&*))) RWÃ Sa[ ] \ RÃ SZ ÃWZ ÃÃ3\	E`] XSQb = ] `aZSgÃ WS\Ã< `]c^ 7O\ abOPSÃ1)Ã7 O\a bOPSÃG] OR = gO\ \ Wa%ÃB	7] `\WUÃC] ' = L &I#H$ HVSSbÃÃ]T *

9` WZSS  I ] [ [ gÃ Sa[ ]\R =SZ`S`3  HSOWÃ ] `UO\ >\a^SQb]`3 HO O/Ã O bSbb	7] `\WUÃ]QQbW\3  6Q] aaÃT][ ÃÃ?]O_cW/ ÃG]ORÃ+ *' ///-1% Ã0)' +/2+)0$ < `]c\RÃHc` TQQSÃ ZSdQbW8 9 OSÃaOb3Ã2*(+) +) 9 OSÃS\R3Ã2(+*(+)+)	
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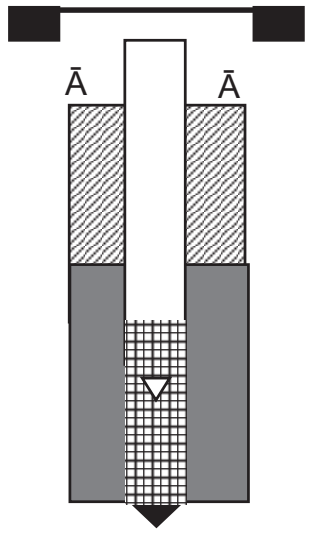

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HbOWÃ ,' -*"
L SZÃaQ SS\3Ã'.-" Ãj Ã1' .-"
CObWÃÃP QY TZ3Ã"ÃbÃ*
7S\ bj \ WÃaSQ3Ã"ÃbÃ."
HO RÃ\QQY3Ã"ÃbÃ*1"
: \RÃTÃP]` \WUÃ+)"
: \ RÃTÃQ[^ZS3Ã\O

< `O\cZO`Ã-]WZa		8]VSa\WSÃ] \Za		E`]^\]` bWa ÃI aSR	L SZÃÃabQZ ZbQW\ ÃQSg
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*) ÃÃ,)	B 'Ã9: CH:	- Ã&Ã1	B 'ÃHI >; ;	H] [SÃ+)Ã&Ã	&7: CID C>I:
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8 O^SÃ]RÃ SabÃ]` \WU . ÃG QgPS`ÃG OR%ÃZSO\a ÃB 6Ã+/., #)1$ Ã+-)&*))) RWÃ Sa[ ] \ RÃ SZ ÃWZ ÃQ\	E`] XSQb = ] `aZSgÃ WS\Ã< `]c^ 7O\ abOPSZÃ1)Ã7 O\a bOPSZÃG] OR = gO\ \ Ã%ÃB	7] `\WUÃC] ' = L &I#B$ HVSSbÃÃ]T *

9` WZZS  I ] [ [ gÃ Sa[ ]R =SZ`S`3  HSO\Ã ] `UO\ >\a^SQb]`3 HO O/Ã O bZSbb	7] `\WUÃZ]QQbW\3  6Q] aaÃT][ Ã]O_cW/ÃGRÃ+*'  ///.,%  Ã0)' +/2*,$ < `]c\RÃHc` TQQSÃ ZSdQbW8 9 QbSÃ aQb3Ã2*(+) +) 9 QbSÃS\R3Ã2(+*(+)+)	
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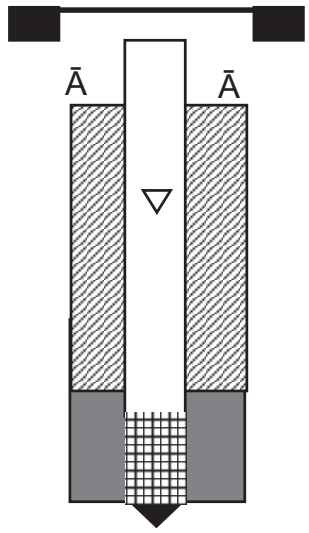

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L SZÃ 9 S^bV Ã+1'2/"
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7S\b] \ WbSÃU] cb3ÃÃbÃ*, "
7S\b] \WbSÃU]cbÃaZ e 3Ã," Ã Ã+)"
HO\RÃOQ 3Ã+)" Ã Ã+1'2/"
: \RÃ TÃP] ` \WUÃ+1"
: \RÃ TÃaO[^ZSÃ)"

< `O\cZO`Ã+]WZa		8]VSa\WSÃ] \Wa		E`]^]` b]Na Ã laSR
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-Ã ÃÃ)	ADDH:	+ÃÃ-	HD; I	AWbSZÃ Ã*ÃÃ+)
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,) ÃÃ.)	9: CH:	1ÃÃ.	HI >; ;	6\ RÃÃÃÃ Ã ÃÃ)
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8 O^SÃ]RÃ SabÃ]` \WU . ÃG OgPS`ÃG OR%ÃZSO\a°Ã8 6Ã+/., #)1$ Ã+-)&*))) RWÃ Sa[ ] \ RÃ SZ ÃWZ ÃÃ\	E`] XSOb = ] `aZSgÃ WS\Ã< `]c^ 7O\ abOPSZÃ1)Ã7 O\a bOPSZÃG] OR = gO\ \ Ã%ÃB	7] `\WUÃC] ' = L &J#9$ HVSSbÃÃ]T *

9` WZZS I ] [ [ gÃ Sa[ ]\R =SZ`S`3 HSO\Ã8 ] `UO\ >\a^SOb]`3 HO\O\Ã7 O bZSbb	7] `\WUÃZ]OOb\ 3 L S\Rg"aÃ+*' / /./1% Ã80)' +)02)1$ < `]c\RÃHc` TOOSÃ ZSdOb\8 9 ObSÃ\aOb3Ã2+(+) +) 9 ObSÃS\R3Ã2(++(+)+)	

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7 S\bj]\WbSÃU]cb ÃaZ e 3Ã1" Ãj Ã+"
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: \RÃ TÃP] ` \WU3Ã,"
: \RÃ TÃaO[^ZS Ã"

< `O\cZO`Ã+]WZa		8]VSa\WSÃ+] \Wa		E`]^]` bWa Ã aSR	L SZZÃ\aOb ZZ\QM\ ÃGSg
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9`WZZS I ][ [ gÃ Sa[ ]\R =SZ`S`3 HSO\Ã8]`UO\ >\a^SQb]`3 HO O/Ã O bZSbb	7]`\WUÃZ]QQb\W3 6Q]aaÃT][ Ã]O_cV/ÃGRÃ+*' ///.,% Ã0)' +/2*,$ <`]c\RÃHc`TOQSÃZSdOb\W8 9 ObSÃaCb3Ã2*(+)+) 9 ObSÃSR3Ã2*(+)+)	

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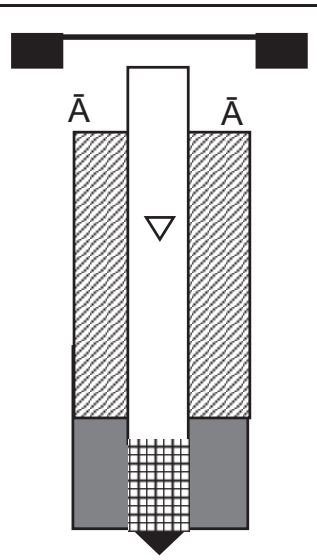

Not to scale

L SZZÃ S^b/Ã*1'2/"
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COWÃ3Ã'ÃbÃ."
7S\b]\WSÃU]cb3ÃÃbÃ*,"
7S\b]\WSÃU]cbÃe 3Ã*"ÃbÃ*"
HO RÃ^OQ3Ã*)" Ã Ã*1'2/"
:\RÃTÃP]`\WUÃ*1"
:\RÃTÃaO[^ZSÃ)"

<`OcZO`Ã*]WZa		8]VSa\WSÃ]\WZa		E`]^]` bWa Ã aSR	L SZZÃ>abQZZbW Ã@g
7ADL H(;I	9: CH>N	7ADL H(;I	9: CH>N		&8 DC8G: I :
)Ã&Ã	K'ÃADDH:	5Ã+	K'ÃHD; I	I `OQSÃÃÃÃ*)	&H6C9 Ã68 @
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9` WZZS  I ] [ [ gÃ Sa[ ]\R =SZ`S`3  HSOWÃ8 ] `UO\ >\a^SQb]`3  HO`O/Ã`O bZSbb	7] `\WUÃZ]QQbWV 3  6Q] aaÃT][ ÃÃ?]O_cW/ ÃG] OR«Ã *' ///-1% Ã0)' +/2+)0$ < `]c\RÃHc`TOQSÃZSdOWV8 9 ObSÃaOb3Ã2*(+)+) 9 ObSÃSR3Ã2*(+)+)	

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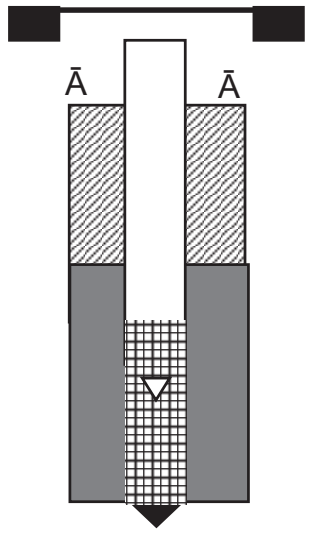

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,)Ã&Ã)	9: CH:	1Ã&Ã.	HI >; ;	6\ RÃÃÃÃ&Ã)	&H8 G::C
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8 O^SÃ]RÃ SabÃ]` \WU . ÃG OgPS`ÃG OR%ÃZSO\a°Ã8 6Ã+/., #)1$ Ã-)&*))) RWÃ Sa[ ]\RÃL SZÃ `WZZÃÃG\	E`]XSOb =]`aZSgÃL WSÃ<`]c^ 7O\abOPSZÃ1)Ã7O\abOPSZÃG]OR =gO\\Wa°Ã8 6	7]`\WUÃC]' =L &J#9$ HVSSbÃÃ]T *

9`WZZS I ][ [ gÃ Sa[ ]\R =SZ`S`3 HSO\Ã8]`UO\ >\a^SOb]`3 HO O/Ã O bZSbb	7]`\WUÃZ]OOb\W3 L S\Rg"aÃ+* //./1% Ã80)' +)02)1$ <`]c\RÃHc`TOOSÃZSdOh\W8 9 ObSÃaOb3Ã2+(+)+) 9 ObSÃSR3Ã2+(+)+)	

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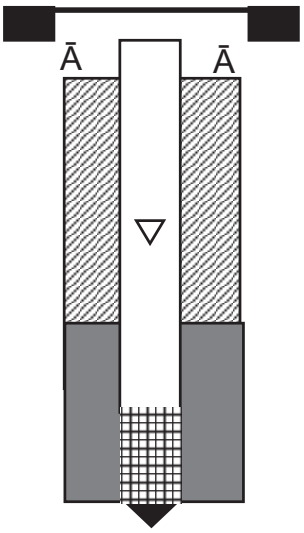

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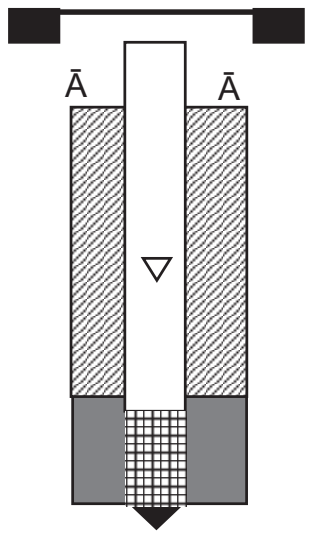

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IEP Inc. BORING LOG

BORING NO. OW-9

SHEET 1 OF 2

PROJECT Barnstable Water Company	PROJECT
LOCATION Rte 28 + Yarmouth Road	ELEVATION AND DATUM 24.55(G) 24.76(MP), 24.82(CP), 24.56(RP), MSL
BORING CONTRACTOR Desmond Well Drilling	DATE 21 July 87 / COMPLETION DEPTH 95'
BORING EQUIPMENT Hollow Stem Auger	OBSERVED WATER LEVEL DATA ~18'

ELEV.	DESCRIPTION	DEPTH SCALE	WELL DETAILS	SAMPLE NO.	REMARKS
	0-10' vf/m+ SAND and f/m+ gravel	5'			OW-9RR installed 18 Aug 87 cement water boxes w/ clamp seals; 2" diameter PVC risers
	brown m/c+ SAND, trace f gravel	10'		SS-1	3-4-6, R=12"
	~12-14' layer of m/c+ gravel	15'			gravel up to 4" diameter
	14' back into dk br m/c+ Sand; f/c+ SAND, trace f gravel	20'		SS-2	8-5-7, R=16"
		25'			10', 0.010 slot, Sch. 40, flush joint threaded PVC screen w/ point
	brown m/c+ SAND, some f gravel	30'		SS-3	4-8-8
		35'			
	brown f/c+ SAND, some f/m gravel	40'		SS-4	6-5-4 HNU (headspace in sample jar) 2ppm
	f/c+ SAND; some f gravel	45'		SS-5	4-7-13, R=1/2" (first attempt, 16-5-6, empty)
	NO recovery	50'		SS-6	4-6-11 R=0"; no change on auger flights
	brown f/c+ SAND; some f gravel	55'		SS-7	17-15-15, R=18"; HNU 0.5ppm red brown Fe staining,
	brown m/c+ SAND, some f gravel	60'		SS-8	2-5-9
	red brown m/c+ SAND, some f gravel	65'		SS-9	15-11-8

INSPECTOR: M. Nelson

IEP Inc. BORING LOG

BORING NO. OW-9

SHEET 2 OF 2

PROJECT Barnstable Water Company	PROJECT
LOCATION Rte 28 + Yarmouth Road	ELEVATION AND DATUM MSL 24.55(s), 24.76(m), 24.82(d), 24.66(d)
BORING CONTRACTOR Desmond Well Drilling	DATE 21 JULY 87 / COMPLETION DEPTH 95'
BORING EQUIPMENT Hollow Stem Augers	OBSERVED WATER LEVEL DATA ~18'

ELEV.	DESCRIPTION	DEPTH SCALE	WELL DETAILS	SAMPLE NO.	REMARKS
		70'			
	F/C + SAND, some f gravel	75'		SS-10	21-12-12, R=18", HNU=0 ppm
		80'			
	same, brown	85'		SS-11	15-15-19 HNU=0 ppm
	pockets of brown and grey CLAY on inst. flight of auger	90'			10', 0.010 slot, schedule 40, flush joint threaded, PVC screens with point
	BOH 95'	95'			
		100'			
		105'			
		110'			

INSPECTOR: M. Nelson

BORING LOG

Boring No. OW-18
Sheet 1 of 2

Project: Water Quality Investigation
Client: Maher Wellfield Task Force
Boring Contractor: Desmond Well Drilling, Inc.
Boring Equipment: hollow stem auger
Ground Water: Date Depth, ft.

Date: 30 July 1990
Completion Depth: 125.5'
Elevation: 39.27 (s), 39.12 (m), 39.06 (d) msl
Inspector: M. Nelson, R. Lamb

Depth (feet)	Description	Sample Number	Penetra./ Recovery	Blow Count	Comments	Well Details
0	f/c SAND, m gravel				cemented water boxes with clay seals	
5						
10						
15					2" diameter, schedule 40, flush joint threaded, PVC risers	
20						
25	f/m+c SAND, some f/m gravel	ss-1		6-14-14	10', 0.010 slot, schedule 40, flush joint threaded, PVC	
30	f/c SAND, trace gravel	ss-2	18"/6"	3-5-9	screen with point set at 34'	
35	f/m+c SAND	ss-3	18"/6"	3-4-8		
40	f/m+c SAND, trace f gravel	ss-4		9-14-25	dark color	
45	f/m+c SAND, some m gravel	ss-5	18"/12"	5-13-30		
50	f/c SAND	ss-6	18"/14"	6-13-28		
55	f/c SAND, trace f gravel	ss-7	18"/2"	5-4-8		
60	f/c+ SAND, trace f gravel	ss-8				
65	f+/m SAND	ss-9			10' heave	
70	f/m SAND; 2" c SAND and f/mgravel	ss-10			Fe stain	
75	f/c+ SAND	ss-11		10-20-9	10', 0.010 slot PVC screen (see above) set at 75'	
80	f/m+/c SAND, trace m gravel	ss-18	24"/24"		2.5' heave	

Proportions used:

trace (tr)	0-10%
little (li)	10-20%
some (so)	20-35%
and	35-50%

Abbreviations:

f = fine	f/c = fine to coarse
m = medium	v = very
c = coarse	+ = more
f/m = fine to medium	- = less

HWH, Inc.

BORING LOG

Boring No. OW-18
Sheet 2 of 2

Project: Water Quality Investigation
Client: Maher Wellfield Task Force
Boring Contractor: Desmond Well Drilling, Inc.
Boring Equipment: hollow stem auger
Ground Water: Date Depth, ft.

Date: 30 July 1990
Completion Depth: 125.5'
Elevation: 39.27 (s), 39.12 (m), 39.06 (d) msl
Inspector: M. Nelson, R. Lamb

Depth (feet)	Description	Sample Number	Penetra./ Recovery	Blow Count	Comments	Well Details
85	f/m+/c SAND, some f gravel	ss-13		7-4-8	small sample	
90	f/c+ SAND, some f/m gravel	ss-14	18"/18"	6-8-10		
95	f/c SAND	ss-15	18"/12"	4-7-8		
100	same	ss-16		3-7-17		
105	f/m+/c SAND	ss-17				
110	greyish f+/m SAND	ss-18	24"/24"		2.5' heave	
115	f/c SAND, trace blue silty sand	ss-19			1.5' heave	
120	f SAND, trace blue-grey silty sand	ss-20			10', 0.010 slot, schedule 40, flush threaded PVC screen with point set at 125.5'	
125	grey f/m SAND, m gravel, f silty sand, trace clay	ss-21				
130	BOH 125.5'					

Proportions used:

trace (tr)	0-10%
little (li)	10-20%
some (so)	20-35%
and	35-50%

Abbreviations:

f = fine	f/c = fine to coarse
m = medium	v = very
c = coarse	+ = more
f/m = fine to medium	- = less

HWH, Inc.

BORING LOG

Boring No. OW-19
Sheet 1 of 2

Project: Remidial Investigation
Client: Barnstable Water Company
Boring Contractor: Desmond Well Drilling, Inc.
Boring Equipment: hollow stem auger
Ground Water:

Date	Depth, ft.
6 Sept 90	~ 27.5

Date: 6 September 1990
Completion Depth: 111.5'
Elevation: 39.13 (s), 39.12 (m), 39.06 (d) msl
Inspector: Odiaga

Depth (feet)	Description	Sample Number	Penetra./ Recovery	Blow Count	Comments	Well Details
0					cemented water boxes with clay seals	
5	vf/v SAND, some gravel, trace coarse sand					
10	f/m+/c SAND, some to trace fine gravel					
15					2" diameter, schedule 40, flush joint threaded PVC risers	
20						
25	f/m+ SAND, trace f gravel	ss-1	18"/≥12"	7-14-15	10', 0.010 slot, PVC screen with point set at 33'	
30	same	ss-2	18"/≥12"	4-10-9		
35	f/c SAND	ss-3	18"/≥12"	5-12-23		
40	vf/c SAND	ss-4	18"/≥12"	4-6-11		
45	same	ss-5	18"/≥12"	3-5-6	dark brown stain at ~44'	
50	vf/f+/m+/c SAND	ss-6	18"/≥12"	3-7-11		
55	same	ss-7	18"/≥12"	6-13-23		
60	f/m+/c SAND, trace f gravel	ss-8	24"/≥12"	7-9-10-23		
65	f/m+/c SAND	ss-9	24"/3"	5-8-12-16		
70	f/c SAND, trace f gravel	ss-10	18"/≥ 12"	5-13-25		
75	vf/f SAND, tr m sand,f gravel	ss-11	18"/≥12"	12-47-46	10'. 0.010 slot, PVC screen with point set at 77'	
80	vf/f+/m+/c SAND, tr f gravel	ss-12	18"/≥12"	2-4-15		

Proportions used:

trace (tr)	0-10%
little (li)	10-20%
some (so)	20-35%
and	35-50%

Abbreviations:

f = fine	f/c = fine to coarse
m = medium	v = very
c = coarse	+ = more
f/m = fine to medium	- = less

HWH, Inc.

BORING LOG

Boring No. OW-19
Sheet 2 of 2

Project: Remidial Investigation
Client: Barnstable Water Company
Boring Contractor: Desmond Well Drilling, Inc.
Boring Equipment: hollow stem auger
Ground Water:

Date	Depth, ft.
6 Sept 90	~ 27.5

Date: 6 September 1990
Completion Depth: 111.5'
Elevation: 39.13 (s), 39.12 (m), 39.06 (d) msl
Inspector: Odiaga

Depth (feet)	Description	Sample Number	Penetra./ Recovery	Blow Count	Comments	Well Details
85	vf/vc SAND, trace f/m gravel	ss-13	18"/>12"	4-5-6		
90	f/c SAND, tr vf sand, vf gravel	ss-14	24"/≥12"	17-10-7-7	may not be a representative sample	
95	f/vc SAND, tr f/m gravel with a 1/16" lens of SILT, tr f/m gravel	ss-15	24"/≥12"	4-10-20-43	slight Fe stain	
100	no recovery	NR	24"/0"	17-20-23/30	10', 0.010 slot, schedule 40, flush joint threadedPVC screenwith point at 110'	
105	vf/vc SAND and vf/f gravel	ss-16	24"/>12"	∞	approximately 300 blows	
110	f/m+/c SAND, tr f gravel 4" brown CLAY, some silt	ss-17	24"/>12"	∞	Fe stained; augered down 18"	
	f/m+/c SAND, tr f gravel	ss-18	24"/>12"	∞	some Fe stain	
115	BOH 111.5'					

Proportions used:

trace (tr)	0-10%
little (li)	10-20%
some (so)	20-35%
and	35-50%

Abbreviations:

f = fine	f/c = fine to coarse
m = medium	v = very
c = coarse	+ = more
f/m = fine to medium	- = less

HWH, Inc.

APPENDIX C

RECENT LABORATORY ANALYSIS REPORTS (OCTOBER AND NOVEMBER 2020)

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

October 2, 2020

Bryan Massa
Horsley Witten Group
90 Route 6A Unit #1
Sandwich, MA 02563

Project Location: Barnstable Municipal Airport
Client Job Number:
Project Number: 19128
Laboratory Work Order Number: 20I1016

Enclosed are results of analyses for samples received by the laboratory on September 18, 2020. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Raymond J. McCarthy
Project Manager

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B267483 10

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Horsley Witten Group
90 Route 6A Unit #1
Sandwich, MA 02563
ATTN: Bryan Massa

REPORT DATE: 10/2/2020

PURCHASE ORDER NUMBER:

PROJECT NUMBER: 19128

ANALYTICAL SUMMARY

WORK ORDER NUMBER: 20I1016

The results of analyses performed on the following samples submitted to the CON-TEST Analytical Laboratory are found in this report.

PROJECT LOCATION: Barnstable Municipal Airport

FIELD SAMPLE #	LAB ID:	MATRIX	SAMPLE DESCRIPTION	TEST	SUB LAB
ME-1	20I1016-01	Ground Water		SOP 434-PFAAS	
ME-2	20I1016-02	Ground Water		SOP 434-PFAAS	
ME-3	20I1016-03	Ground Water		SOP 434-PFAAS	
BMA-Trip Blank	20I1016-04	Trip Blank Water		SOP 434-PFAAS	

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

CASE NARRATIVE SUMMARY

All reported results are within defined laboratory quality control objectives unless listed below or otherwise qualified in this report.

The results of analyses reported only relate to samples submitted to the Con-Test Analytical Laboratory for testing.
I certify that the analyses listed above, unless specifically listed as subcontracted, if any, were performed under my direction according to the approved methodologies listed in this document, and that based upon my inquiry of those individuals immediately responsible for obtaining the information, the material contained in this report is, to the best of my knowledge and belief, accurate and complete.

Lisa A. Worthington
Technical Representative

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Barnstable Municipal Airport | Sample Description: | Work Order: 20I1016

Date Received: 9/18/2020

Field Sample #: ME-1 | Sampled: 9/17/2020 09:05

Sample ID: 20I1016-01

Sample Matrix: Ground Water

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	9.4	2.0	0.64	ng/L	1		SOP 434-PFAAS	9/29/20	10/2/20 2:42	JFC
Perfluorobutanesulfonic acid (PFBS)	1.2	2.0	0.50	ng/L	1		SOP 434-PFAAS	9/29/20	10/2/20 2:42	JFC
Perfluoropentanoic acid (PFPeA)	35	2.0	0.42	ng/L	1		SOP 434-PFAAS	9/29/20	10/2/20 2:42	JFC
Perfluorohexanoic acid (PFHxA)	22	2.0	0.51	ng/L	1		SOP 434-PFAAS	9/29/20	10/2/20 2:42	JFC
Perfluorohexanesulfonic acid (PFHxS)	30	2.0	0.77	ng/L	1		SOP 434-PFAAS	9/29/20	10/2/20 2:42	JFC
Perfluoroheptanoic acid (PFHpA)	11	2.0	0.53	ng/L	1		SOP 434-PFAAS	9/29/20	10/2/20 2:42	JFC
Perfluoroheptanesulfonic acid (PFHpS)	1.7	2.0	1.0	ng/L	1		SOP 434-PFAAS	9/29/20	10/2/20 2:42	JFC
Perfluorooctanoic acid (PFOA)	16	2.0	0.71	ng/L	1		SOP 434-PFAAS	9/29/20	10/2/20 2:42	JFC
Perfluorooctanesulfonic acid (PFOS)	110	2.0	0.68	ng/L	1		SOP 434-PFAAS	9/29/20	10/2/20 2:42	JFC
Perfluorooctanesulfonamide (FOSA)	ND	2.0	0.83	ng/L	1	U	SOP 434-PFAAS	9/29/20	10/2/20 2:42	JFC
6:2 Fluorotelomersulfonic acid (6:2FTS A)	34	2.0	0.39	ng/L	1		SOP 434-PFAAS	9/29/20	10/2/20 2:42	JFC
Perfluorononanoic acid (PFNA)	17	2.0	0.63	ng/L	1		SOP 434-PFAAS	9/29/20	10/2/20 2:42	JFC
Perfluorodecanoic acid (PFDA)	ND	2.0	0.62	ng/L	1	U	SOP 434-PFAAS	9/29/20	10/2/20 2:42	JFC
Perfluorodecanesulfonic acid (PFDS)	ND	2.0	0.51	ng/L	1	U	SOP 434-PFAAS	9/29/20	10/2/20 2:42	JFC
N-EtFOSAA	ND	2.0	0.70	ng/L	1	U	SOP 434-PFAAS	9/29/20	10/2/20 2:42	JFC
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	2.0	1.1	ng/L	1	U	SOP 434-PFAAS	9/29/20	10/2/20 2:42	JFC
Perfluoroundecanoic acid (PFUnA)	ND	2.0	0.49	ng/L	1	U	SOP 434-PFAAS	9/29/20	10/2/20 2:42	JFC
N-MeFOSAA	ND	2.0	0.62	ng/L	1	U	SOP 434-PFAAS	9/29/20	10/2/20 2:42	JFC
Perfluorododecanoic acid (PFDoA)	ND	2.0	0.50	ng/L	1	U	SOP 434-PFAAS	9/29/20	10/2/20 2:42	JFC
Perfluorotridecanoic acid (PFTrDA)	ND	2.0	0.67	ng/L	1	U	SOP 434-PFAAS	9/29/20	10/2/20 2:42	JFC
Perfluorotetradecanoic acid (PFTA)	ND	2.0	0.50	ng/L	1	U	SOP 434-PFAAS	9/29/20	10/2/20 2:42	JFC

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
13C-PFHxA	70.1	70-130		10/2/20 2:42
13C-PFDA	72.7	70-130		10/2/20 2:42
d5-NEtFOSAA	80.2	70-130		10/2/20 2:42

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Barnstable Municipal Airport | Sample Description: | Work Order: 20I1016

Date Received: 9/18/2020

Field Sample #: ME-2 | Sampled: 9/17/2020 08:55

Sample ID: 20I1016-02

Sample Matrix: Ground Water

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	4.9	2.0	0.64	ng/L	1		SOP 434-PFAAS	9/29/20	10/2/20 3:03	JFC
Perfluorobutanesulfonic acid (PFBS)	2.8	2.0	0.50	ng/L	1		SOP 434-PFAAS	9/29/20	10/2/20 3:03	JFC
Perfluoropentanoic acid (PFPeA)	22	2.0	0.42	ng/L	1		SOP 434-PFAAS	9/29/20	10/2/20 3:03	JFC
Perfluorohexanoic acid (PFHxA)	18	2.0	0.51	ng/L	1		SOP 434-PFAAS	9/29/20	10/2/20 3:03	JFC
Perfluorohexanesulfonic acid (PFHxS)	40	2.0	0.77	ng/L	1		SOP 434-PFAAS	9/29/20	10/2/20 3:03	JFC
Perfluoroheptanoic acid (PFHpA)	5.5	2.0	0.53	ng/L	1		SOP 434-PFAAS	9/29/20	10/2/20 3:03	JFC
Perfluoroheptanesulfonic acid (PFHpS)	2.0	2.0	1.0	ng/L	1		SOP 434-PFAAS	9/29/20	10/2/20 3:03	JFC
Perfluorooctanoic acid (PFOA)	7.7	2.0	0.71	ng/L	1		SOP 434-PFAAS	9/29/20	10/2/20 3:03	JFC
Perfluorooctanesulfonic acid (PFOS)	95	2.0	0.68	ng/L	1		SOP 434-PFAAS	9/29/20	10/2/20 3:03	JFC
Perfluorooctanesulfonamide (FOSA)	ND	2.0	0.83	ng/L	1	U	SOP 434-PFAAS	9/29/20	10/2/20 3:03	JFC
6:2 Fluorotelomersulfonic acid (6:2FTS A)	ND	2.0	0.39	ng/L	1	U	SOP 434-PFAAS	9/29/20	10/2/20 3:03	JFC
Perfluorononanoic acid (PFNA)	3.0	2.0	0.63	ng/L	1		SOP 434-PFAAS	9/29/20	10/2/20 3:03	JFC
Perfluorodecanoic acid (PFDA)	ND	2.0	0.62	ng/L	1	U	SOP 434-PFAAS	9/29/20	10/2/20 3:03	JFC
Perfluorodecanesulfonic acid (PFDS)	ND	2.0	0.51	ng/L	1	U	SOP 434-PFAAS	9/29/20	10/2/20 3:03	JFC
N-EtFOSAA	ND	2.0	0.70	ng/L	1	U	SOP 434-PFAAS	9/29/20	10/2/20 3:03	JFC
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	2.0	1.1	ng/L	1	U	SOP 434-PFAAS	9/29/20	10/2/20 3:03	JFC
Perfluoroundecanoic acid (PFUnA)	ND	2.0	0.49	ng/L	1	U	SOP 434-PFAAS	9/29/20	10/2/20 3:03	JFC
N-MeFOSAA	ND	2.0	0.62	ng/L	1	U	SOP 434-PFAAS	9/29/20	10/2/20 3:03	JFC
Perfluorododecanoic acid (PFDoA)	ND	2.0	0.50	ng/L	1	U	SOP 434-PFAAS	9/29/20	10/2/20 3:03	JFC
Perfluorotridecanoic acid (PFTrDA)	ND	2.0	0.67	ng/L	1	U	SOP 434-PFAAS	9/29/20	10/2/20 3:03	JFC
Perfluorotetradecanoic acid (PFTA)	ND	2.0	0.50	ng/L	1	U	SOP 434-PFAAS	9/29/20	10/2/20 3:03	JFC

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
13C-PFHxA	71.9	70-130		10/2/20 3:03
13C-PFDA	73.3	70-130		10/2/20 3:03
d5-NEtFOSAA	80.5	70-130		10/2/20 3:03

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Project Location: Barnstable Municipal Airport | Sample Description: | Work Order: 20I1016

Date Received: 9/18/2020

Field Sample #: ME-3 | Sampled: 9/17/2020 08:45

Sample ID: 20I1016-03

Sample Matrix: Ground Water

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	3.3	2.0	0.64	ng/L	1		SOP 434-PFAAS	9/29/20	10/2/20 3:25	JFC
Perfluorobutanesulfonic acid (PFBS)	0.65	2.0	0.50	ng/L	1		SOP 434-PFAAS	9/29/20	10/2/20 3:25	JFC
Perfluoropentanoic acid (PFPeA)	9.5	2.0	0.42	ng/L	1		SOP 434-PFAAS	9/29/20	10/2/20 3:25	JFC
Perfluorohexanoic acid (PFHxA)	6.8	2.0	0.51	ng/L	1		SOP 434-PFAAS	9/29/20	10/2/20 3:25	JFC
Perfluorohexanesulfonic acid (PFHxS)	18	2.0	0.77	ng/L	1		SOP 434-PFAAS	9/29/20	10/2/20 3:25	JFC
Perfluoroheptanoic acid (PFHpA)	3.6	2.0	0.53	ng/L	1		SOP 434-PFAAS	9/29/20	10/2/20 3:25	JFC
Perfluoroheptanesulfonic acid (PFHpS)	1.1	2.0	1.0	ng/L	1		SOP 434-PFAAS	9/29/20	10/2/20 3:25	JFC
Perfluorooctanoic acid (PFOA)	12	2.0	0.71	ng/L	1		SOP 434-PFAAS	9/29/20	10/2/20 3:25	JFC
Perfluorooctanesulfonic acid (PFOS)	72	2.0	0.68	ng/L	1		SOP 434-PFAAS	9/29/20	10/2/20 3:25	JFC
Perfluorooctanesulfonamide (FOSA)	2.0	2.0	0.83	ng/L	1		SOP 434-PFAAS	9/29/20	10/2/20 3:25	JFC
6:2 Fluorotelomersulfonic acid (6:2FTS A)	7.1	2.0	0.39	ng/L	1		SOP 434-PFAAS	9/29/20	10/2/20 3:25	JFC
Perfluorononanoic acid (PFNA)	4.0	2.0	0.63	ng/L	1		SOP 434-PFAAS	9/29/20	10/2/20 3:25	JFC
Perfluorodecanoic acid (PFDA)	ND	2.0	0.62	ng/L	1	U	SOP 434-PFAAS	9/29/20	10/2/20 3:25	JFC
Perfluorodecanesulfonic acid (PFDS)	ND	2.0	0.51	ng/L	1	U	SOP 434-PFAAS	9/29/20	10/2/20 3:25	JFC
N-EtFOSAA	ND	2.0	0.70	ng/L	1	U	SOP 434-PFAAS	9/29/20	10/2/20 3:25	JFC
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	2.0	1.1	ng/L	1	U	SOP 434-PFAAS	9/29/20	10/2/20 3:25	JFC
Perfluoroundecanoic acid (PFUnA)	ND	2.0	0.49	ng/L	1	U	SOP 434-PFAAS	9/29/20	10/2/20 3:25	JFC
N-MeFOSAA	ND	2.0	0.62	ng/L	1	U	SOP 434-PFAAS	9/29/20	10/2/20 3:25	JFC
Perfluorododecanoic acid (PFDoA)	ND	2.0	0.50	ng/L	1	U	SOP 434-PFAAS	9/29/20	10/2/20 3:25	JFC
Perfluorotridecanoic acid (PFTrDA)	ND	2.0	0.67	ng/L	1	U	SOP 434-PFAAS	9/29/20	10/2/20 3:25	JFC
Perfluorotetradecanoic acid (PFTA)	ND	2.0	0.50	ng/L	1	U	SOP 434-PFAAS	9/29/20	10/2/20 3:25	JFC

Surrogates	% Recovery	Recovery Limits	Flag/Qual		
13C-PFHxA	71.3	70-130		10/2/20	3:25
13C-PFDA	73.7	70-130		10/2/20	3:25
d5-NEtFOSAA	79.3	70-130		10/2/20	3:25

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Project Location: Barnstable Municipal Airport | Sample Description: | Work Order: 20I1016

Date Received: 9/18/2020

Field Sample #: BMA-Trip Blank | Sampled: 9/17/2020 09:20

Sample ID: 20I1016-04

Sample Matrix: Trip Blank Water

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	ND	2.0	0.64	ng/L	1	U	SOP 434-PFAAS	9/29/20	10/2/20 3:46	JFC
Perfluorobutanesulfonic acid (PFBS)	ND	2.0	0.50	ng/L	1	U	SOP 434-PFAAS	9/29/20	10/2/20 3:46	JFC
Perfluoropentanoic acid (PFPeA)	ND	2.0	0.42	ng/L	1	U	SOP 434-PFAAS	9/29/20	10/2/20 3:46	JFC
Perfluorohexanoic acid (PFHxA)	ND	2.0	0.51	ng/L	1	U	SOP 434-PFAAS	9/29/20	10/2/20 3:46	JFC
Perfluorohexanesulfonic acid (PFHxS)	ND	2.0	0.77	ng/L	1	U	SOP 434-PFAAS	9/29/20	10/2/20 3:46	JFC
Perfluoroheptanoic acid (PFHpA)	ND	2.0	0.53	ng/L	1	U	SOP 434-PFAAS	9/29/20	10/2/20 3:46	JFC
Perfluoroheptanesulfonic acid (PFHpS)	ND	2.0	1.0	ng/L	1	U	SOP 434-PFAAS	9/29/20	10/2/20 3:46	JFC
Perfluorooctanoic acid (PFOA)	ND	2.0	0.71	ng/L	1	U	SOP 434-PFAAS	9/29/20	10/2/20 3:46	JFC
Perfluorooctanesulfonic acid (PFOS)	ND	2.0	0.68	ng/L	1	U	SOP 434-PFAAS	9/29/20	10/2/20 3:46	JFC
Perfluorooctanesulfonamide (FOSA)	ND	2.0	0.83	ng/L	1	U	SOP 434-PFAAS	9/29/20	10/2/20 3:46	JFC
6:2 Fluorotelomersulfonic acid (6:2FTS A)	ND	2.0	0.39	ng/L	1	U	SOP 434-PFAAS	9/29/20	10/2/20 3:46	JFC
Perfluorononanoic acid (PFNA)	ND	2.0	0.63	ng/L	1	U	SOP 434-PFAAS	9/29/20	10/2/20 3:46	JFC
Perfluorodecanoic acid (PFDA)	ND	2.0	0.62	ng/L	1	U	SOP 434-PFAAS	9/29/20	10/2/20 3:46	JFC
Perfluorodecanesulfonic acid (PFDS)	ND	2.0	0.51	ng/L	1	U	SOP 434-PFAAS	9/29/20	10/2/20 3:46	JFC
N-EtFOSAA	ND	2.0	0.70	ng/L	1	U	SOP 434-PFAAS	9/29/20	10/2/20 3:46	JFC
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	2.0	1.1	ng/L	1	U	SOP 434-PFAAS	9/29/20	10/2/20 3:46	JFC
Perfluoroundecanoic acid (PFUnA)	ND	2.0	0.49	ng/L	1	U	SOP 434-PFAAS	9/29/20	10/2/20 3:46	JFC
N-MeFOSAA	ND	2.0	0.62	ng/L	1	U	SOP 434-PFAAS	9/29/20	10/2/20 3:46	JFC
Perfluorododecanoic acid (PFDoA)	ND	2.0	0.50	ng/L	1	U	SOP 434-PFAAS	9/29/20	10/2/20 3:46	JFC
Perfluorotridecanoic acid (PFTrDA)	ND	2.0	0.67	ng/L	1	U	SOP 434-PFAAS	9/29/20	10/2/20 3:46	JFC
Perfluorotetradecanoic acid (PFTA)	ND	2.0	0.50	ng/L	1	U	SOP 434-PFAAS	9/29/20	10/2/20 3:46	JFC

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
13C-PFHxA	74.5	70-130		10/2/20 3:46
13C-PFDA	79.7	70-130		10/2/20 3:46
d5-NEtFOSAA	80.6	70-130		10/2/20 3:46

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Sample Extraction Data

Prep Method: SOP 434-PFAAS **Analytical Method: SOP 434-PFAAS**

Lab Number [Field ID]	Batch	Initial [mL]	Final [mL]	Date
20I1016-01 [ME-1]	B267483	250	1.00	09/29/20
20I1016-02 [ME-2]	B267483	250	1.00	09/29/20
20I1016-03 [ME-3]	B267483	250	1.00	09/29/20
20I1016-04 [BMA-Trip Blank]	B267483	250	1.00	09/29/20

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QUALITY CONTROL

Semivolatile Organic Compounds by - LC/MS-MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B267483 - SOP 434-PFAAS										
Blank (B267483-BLK1)				Prepared: 09/29/20 Analyzed: 10/02/20						
Perfluorobutanoic acid (PFBA)	ND	2.0	ng/L							U
Perfluorobutanesulfonic acid (PFBS)	ND	2.0	ng/L							U
Perfluoropentanoic acid (PFPeA)	ND	2.0	ng/L							U
Perfluorohexanoic acid (PFHxA)	ND	2.0	ng/L							U
Perfluorohexanesulfonic acid (PFHxS)	ND	2.0	ng/L							U
Perfluoroheptanoic acid (PFHpA)	ND	2.0	ng/L							U
Perfluoroheptanesulfonic acid (PFHpS)	ND	2.0	ng/L							U
Perfluorooctanoic acid (PFOA)	ND	2.0	ng/L							U
Perfluorooctanesulfonic acid (PFOS)	ND	2.0	ng/L							U
Perfluorooctanesulfonamide (FOSA)	ND	2.0	ng/L							U
6:2 Fluorotelomersulfonic acid (6:2FTS A)	ND	2.0	ng/L							U
Perfluorononanoic acid (PFNA)	ND	2.0	ng/L							U
Perfluorodecanoic acid (PFDA)	ND	2.0	ng/L							U
Perfluorodecanesulfonic acid (PFDS)	ND	2.0	ng/L							U
N-EtFOSAA	ND	2.0	ng/L							U
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	2.0	ng/L							U
Perfluoroundecanoic acid (PFUnA)	ND	2.0	ng/L							U
N-MeFOSAA	ND	2.0	ng/L							U
Perfluorododecanoic acid (PFDoA)	ND	2.0	ng/L							U
Perfluorotridecanoic acid (PFTrDA)	ND	2.0	ng/L							U
Perfluorotetradecanoic acid (PFTA)	ND	2.0	ng/L							U
Surrogate: 13C-PFHxA	*29.9*		ng/L	40.0		74.8	70-130			
Surrogate: 13C-PFDA	*31.7*		ng/L	40.0		79.4	70-130			
Surrogate: d5-NEtFOSAA	*131*		ng/L	160		81.9	70-130			
LCS (B267483-BS1)				Prepared: 09/29/20 Analyzed: 10/02/20						
Perfluorobutanoic acid (PFBA)	16.0	2.0	ng/L	20.0		79.8	70-130			
Perfluorobutanesulfonic acid (PFBS)	15.1	2.0	ng/L	17.7		85.5	70-130			
Perfluoropentanoic acid (PFPeA)	18.2	2.0	ng/L	20.0		91.2	70-130			
Perfluorohexanoic acid (PFHxA)	17.1	2.0	ng/L	20.0		85.6	70-130			
Perfluorohexanesulfonic acid (PFHxS)	15.0	2.0	ng/L	18.2		82.4	70-130			
Perfluoroheptanoic acid (PFHpA)	16.7	2.0	ng/L	20.0		83.5	70-130			
Perfluoroheptanesulfonic acid (PFHpS)	17.0	2.0	ng/L	19.0		89.7	70-130			
Perfluorooctanoic acid (PFOA)	18.4	2.0	ng/L	20.0		92.0	70-130			
Perfluorooctanesulfonic acid (PFOS)	17.5	2.0	ng/L	18.5		94.5	70-130			
Perfluorooctanesulfonamide (FOSA)	15.9	2.0	ng/L	20.0		79.3	70-130			
6:2 Fluorotelomersulfonic acid (6:2FTS A)	18.6	2.0	ng/L	19.0		97.8	70-130			
Perfluorononanoic acid (PFNA)	20.5	2.0	ng/L	20.0		102	70-130			
Perfluorodecanoic acid (PFDA)	18.8	2.0	ng/L	20.0		94.0	70-130			
Perfluorodecanesulfonic acid (PFDS)	16.5	2.0	ng/L	19.3		85.7	70-130			
N-EtFOSAA	20.7	2.0	ng/L	20.0		103	70-130			
8:2 Fluorotelomersulfonic acid (8:2FTS A)	19.9	2.0	ng/L	19.2		104	70-130			
Perfluoroundecanoic acid (PFUnA)	18.3	2.0	ng/L	20.0		91.6	70-130			
N-MeFOSAA	19.2	2.0	ng/L	20.0		95.8	70-130			
Perfluorododecanoic acid (PFDoA)	16.3	2.0	ng/L	20.0		81.6	70-130			
Perfluorotridecanoic acid (PFTrDA)	16.8	2.0	ng/L	20.0		83.8	70-130			
Perfluorotetradecanoic acid (PFTA)	15.6	2.0	ng/L	20.0		78.2	70-130			
Surrogate: 13C-PFHxA	*29.4*		ng/L	40.0		73.4	70-130			
Surrogate: 13C-PFDA	*31.3*		ng/L	40.0		78.3	70-130			
Surrogate: d5-NEtFOSAA	*125*		ng/L	160		78.1	70-130			

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FLAG/QUALIFIER SUMMARY

*	QC result is outside of established limits.
†	Wide recovery limits established for difficult compound.
‡	Wide RPD limits established for difficult compound.
#	Data exceeded client recommended or regulatory level
ND	Not Detected
RL	Reporting Limit is at the level of quantitation (LOQ)
DL	Detection Limit is the lower limit of detection determined by the MDL study
MCL	Maximum Contaminant Level
	Percent recoveries and relative percent differences (RPDs) are determined by the software using values in the calculation which have not been rounded.
	No results have been blank subtracted unless specified in the case narrative section.
U	Analyte included in the analysis, but not detected

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CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
SOP 434-PFAAS in Water	
Perfluorobutanoic acid (PFBA)	NH-P
Perfluorobutanesulfonic acid (PFBS)	NH-P
Perfluoropentanoic acid (PFPeA)	NH-P
Perfluorohexanoic acid (PFHxA)	NH-P
Perfluorohexanesulfonic acid (PFHxS)	NH-P
Perfluoroheptanoic acid (PFHpA)	NH-P
Perfluorooctanoic acid (PFOA)	NH-P
Perfluorooctanesulfonic acid (PFOS)	NH-P
6:2 Fluorotelomersulfonic acid (6:2FTS A)	NH-P
Perfluorononanoic acid (PFNA)	NH-P
Perfluorodecanoic acid (PFDA)	NH-P
N-EtFOSAA	NH-P
8:2 Fluorotelomersulfonic acid (8:2FTS A)	NH-P
Perfluoroundecanoic acid (PFUnA)	NH-P
N-MeFOSAA	NH-P
Perfluorododecanoic acid (PFDoA)	NH-P
Perfluorotridecanoic acid (PFTrDA)	NH-P
Perfluorotetradecanoic acid (PFTA)	NH-P

The CON-TEST Environmental Laboratory operates under the following certifications and accreditations:

Code	Description	Number	Expires
AIHA	AIHA-LAP, LLC - ISO17025:2017	100033	03/1/2022
MA	Massachusetts DEP	M-MA100	06/30/2021
CT	Connecticut Department of Publilc Health	PH-0567	09/30/2021
NY	New York State Department of Health	10899 NELAP	04/1/2021
NH-S	New Hampshire Environmental Lab	2516 NELAP	02/5/2021
RI	Rhode Island Department of Health	LAO00112	12/30/2020
NC	North Carolina Div. of Water Quality	652	12/31/2020
NJ	New Jersey DEP	MA007 NELAP	06/30/2021
FL	Florida Department of Health	E871027 NELAP	06/30/2021
VT	Vermont Department of Health Lead Laboratory	LL015036	07/30/2021
ME	State of Maine	2011028	06/9/2021
VA	Commonwealth of Virginia	460217	12/14/2020
NH-P	New Hampshire Environmental Lab	2557 NELAP	09/6/2021
VT-DW	Vermont Department of Health Drinking Water	VT-255716	06/12/2021
NC-DW	North Carolina Department of Health	25703	07/31/2021
PA	Commonwealth of Pennsylvania DEP	68-05812	06/30/2021
MI	Dept. of Env, Great Lakes, and Energy	9100	09/6/2021

20I1016

con-test ANALYTICAL LABORATORY

Phone: 413-525-2332
Fax: 413-525-6405
Email: info@contestlabs.com

http://www.contestlabs.com

CHAIN OF CUSTODY RECORD

39 Spruce Street
East Longmeadow, MA 01028

Doc # 381 Rev 2_06262019

Page 1 of 1

Company Name: Horsley Witten Group
Address: 90 Rt 6A SANDWICH MA
Phone: 508 833 6600
Project Name: PFAS Investigation
Project Location: Barnstable Municipal Airport
Project Number: 20102
Project Manager: Bryan Massen
Con-Test Quote Name/Number:
Invoice Recipient:
Sampled By: HW-MD

Requested Turnaround Time
7-Day ☐ 10-Day ☐
PFAS 10-Day (std) X Due Date:

Rush - Approval Required
1-Day ☐ 3-Day ☐
2-Day ☐ 4-Day ☐

Dissolved Metals Samples
○ Field Filtered
○ Lab to Filter

Orthophosphate Samples
○ Field Filtered
○ Lab to Filter

Data Delivery
Format: PDF X EXCEL X
Other:
CLP Like Data Pkg Required: ☐
Email To: mdemanche@horsleywitten.com
Fax To #: BMassen@HorsleyWitten.com

ANALYSIS REQUESTED

Con-Test Work Order#	Client Sample ID / Description	Beginning Date/Time	Ending Date/Time	COMP/GRAB	[1]Matrix Code	Conc Code	VIALS	GLASS	PLASTIC	BACTERIA	ENCORE	PFAS by Isotope Dilution, Extract and Hold ONLY
1	ME-1	0905	0905	Grab	GW	U			2			X
2	ME-2	0855	0855	Grab	GW	U			2			X
3	ME-3	0845	0845	Grab	GW	U			2			X
4	BMA-Trip Blank	0920	0920						2			X
											1	

[2] Preservation Code

Lab Use Only
Total Number Of:
VIALS
GLASS
PLASTIC 8
BACTERIA
ENCORE

Glassware in the fridge? Y / N
Glassware in freezer? Y / N
Prepackaged Cooler? Y / N

*Contest is not responsible for missing samples from prepacked coolers

[1] Matrix Codes:
GW = Ground Water
WW = Waste Water
DW = Drinking Water
A = Air
S = Soil
SL = Sludge
SOL = Solid
O = Other (please define)

[2] Preservation Codes:
I = Iced
H = HCL
M = Methanol
N = Nitric Acid
S = Sulfuric Acid
B = Sodium Bisulfate
X = Sodium Hydroxide
T = Sodium Thiosulfate
O = Other (please define)

Relinquished by: (signature)	Date/Time:
	9/18/20 1340
Received by: (signature)	Date/Time:
Paul Chaloner	9-18-20 1340
Relinquished by: (signature)	Date/Time:
Paul Chaloner	9-18-20 1740
Received by: (signature)	Date/Time:
Abigail Jewett	9/18/20 1741
Relinquished by: (signature)	Date/Time:
Abigail Jewett	9/18/20 1857
Received by: (signature)	Date/Time:
Emily Mi 4:50	9/18/20 1850
Relinquished by: (signature)	Date/Time:
Received by: (signature)	Date/Time:

Client Comments:
BMA Trip Blank sample contains lab-provided PFAS-free water.

Detection Limits Requirements
MA MCP GW-1
CT

Special Requirements
X MA MCP required
MCP Certification Form Required
☐ CT RCP Required
RCP Certification Form Required
☐ MA State DW Required
PWSID #

Please use the following codes to indicate possible sample concentration within the Conc Code column above:
H - High; M - Medium; L - Low; C - Clean; U - Unknown

NELAC and AIHA-LAP, LLC Accredited

Project Entity
Government ☐ Municipality ☐ MWRA ☐ WRTA ☐
Federal ☐ 21 J ☐ School ☐
City ☐ Brownfield ☐ MBTA ☐

Other
☐ Chromatogram
☐ AIHA-LAP,LLC

PCB ONLY
☐ Soxhlet
☐ Non Soxhlet

Comments:

Disclaimer: Con-Test Labs is not responsible for any omitted information on the Chain of Custody. The Chain of Custody is a legal document that must be complete and accurate and is used to determine what analyses the laboratory will perform. Any missing information is not the laboratory's responsibility. Con Test values your partnership on each project and will try to assist with missing information, but will not b held accountable.

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I Have Not Confirmed Sample Container Numbers With Lab Staff Before Relinquishing Over Samples_____

con-test® ANALYTICAL LABORATORY

Doc# 277 Rev 5 2017

Login Sample Receipt Checklist - (Rejection Criteria Listing - Using Acceptance Policy) Any False Statement will be brought to the attention of the Client - State True or False

Client Horsley Witten Group

Received By [illegible] Date 9/18/20 Time 1650

How were the samples received? In Cooler T No Cooler _____ On Ice T No Ice _____
Direct from Sampling _____ Ambient _____ Melted Ice _____

Were samples within Temperature? 2-6°C T By Gun # 4 Actual Temp - 4.6
By Blank # _____ Actual Temp - _____

Was Custody Seal Intact? NA Were Samples Tampered with? NA
Was COC Relinquished ? T Does Chain Agree With Samples? T
Are there broken/leaking/loose caps on any samples? F
Is COC in ink/ Legible? T Were samples received within holding time? T
Did COC include all pertinent Information? Client T Analysis T Sampler Name F
Project T ID's T Collection Dates/Times F F
Are Sample labels filled out and legible? T
Are there Lab to Filters? F Who was notified? _____
Are there Rushes? F Who was notified? _____
Are there Short Holds? F Who was notified? _____
Is there enough Volume? T
Is there Headspace where applicable? F MS/MSD? F
Proper Media/Containers Used? T Is splitting samples required? F
Were trip blanks received? T On COC? T
Do all samples have the proper pH? NA Acid _____ Base _____

Vials	#	Containers:	#		#		#
Unp-		1 Liter Amb.		1 Liter Plastic		16 oz Amb.	
HCL-		500 mL Amb.		500 mL Plastic		8oz Amb/Clear	
Meoh-		250 mL Amb.		250 mL Plastic	3	4oz Amb/Clear	
Bisulfate-		Flashpoint		Col./Bacteria		2oz Amb/Clear	
DI-		Other Glass		Other Plastic		Encore	
Thiosulfate-		SOC Kit		Plastic Bag		Frozen:	
Sulfuric-		Perchlorate		Ziplock			

Unused Media

Vials	#	Containers:	#		#		#
Unp-		1 Liter Amb.		1 Liter Plastic		16 oz Amb.	
HCL-		500 mL Amb.		500 mL Plastic		8oz Amb/Clear	
Meoh-		250 mL Amb.		250 mL Plastic		4oz Amb/Clear	
Bisulfate-		Col./Bacteria		Flashpoint		2oz Amb/Clear	
DI-		Other Plastic		Other Glass		Encore	
Thiosulfate-		SOC Kit		Plastic Bag		Frozen:	
Sulfuric-		Perchlorate		Ziplock			

Comments:

No collection dates on COC - went by sample labels.

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

November 24, 2020

Bryan Massa
Horsley Witten Group
90 Route 6A Unit #1
Sandwich, MA 02563

Project Location: Hyannis, MA
Client Job Number:
Project Number: 20102
Laboratory Work Order Number: 20K0392

Enclosed are results of analyses for samples received by the laboratory on November 9, 2020. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Raymond J. McCarthy
Project Manager

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Horsley Witten Group
90 Route 6A Unit #1
Sandwich, MA 02563
ATTN: Bryan Massa

REPORT DATE: 11/24/2020

PURCHASE ORDER NUMBER:

PROJECT NUMBER: 20102

ANALYTICAL SUMMARY

WORK ORDER NUMBER: 20K0392

The results of analyses performed on the following samples submitted to the CON-TEST Analytical Laboratory are found in this report.

PROJECT LOCATION: Hyannis, MA

FIELD SAMPLE #	LAB ID:	MATRIX	SAMPLE DESCRIPTION	TEST	SUB LAB
RB-1 (m)	20K0392-01	Ground Water		SOP 434-PFAAS	
RB-1 (s)	20K0392-02	Ground Water		SOP 434-PFAAS	
OW-19 (m)	20K0392-03	Ground Water		SOP 434-PFAAS	
OW-19 (s)	20K0392-04	Ground Water		SOP 434-PFAAS	
HW-Q (s)	20K0392-05	Ground Water		SOP 434-PFAAS	

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CASE NARRATIVE SUMMARY

All reported results are within defined laboratory quality control objectives unless listed below or otherwise qualified in this report.

SOP 434-PFAAS

Qualifications:

S-01

The surrogate recovery for this sample is not available due to sample dilution below the surrogate reporting limit required from high analyte concentration and/or matrix interferences.

Analyte & Samples(s) Qualified:

13C-PFDA
20K0392-03RE1[OW-19 (m)]

13C-PFHxA
20K0392-03RE1[OW-19 (m)]

d5-NEtFOSAA
20K0392-03RE1[OW-19 (m)]

The results of analyses reported only relate to samples submitted to the Con-Test Analytical Laboratory for testing.
I certify that the analyses listed above, unless specifically listed as subcontracted, if any, were performed under my direction according to the approved methodologies listed in this document, and that based upon my inquiry of those individuals immediately responsible for obtaining the information, the material contained in this report is, to the best of my knowledge and belief, accurate and complete.

Lisa A. Worthington
Technical Representative

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Hyannis, MA | Sample Description: | Work Order: 20K0392

Date Received: 11/9/2020

Field Sample #: RB-1 (m) | Sampled: 11/5/2020 10:00

Sample ID: 20K0392-01

Sample Matrix: Ground Water

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	10	2.0	0.64	ng/L	1		SOP 434-PFAAS	11/16/20	11/23/20 22:50	JFC
Perfluorobutanesulfonic acid (PFBS)	0.95	2.0	0.50	ng/L	1		SOP 434-PFAAS	11/16/20	11/23/20 22:50	JFC
Perfluoropentanoic acid (PFPeA)	41	2.0	0.42	ng/L	1		SOP 434-PFAAS	11/16/20	11/23/20 22:50	JFC
Perfluorohexanoic acid (PFHxA)	21	2.0	0.51	ng/L	1		SOP 434-PFAAS	11/16/20	11/23/20 22:50	JFC
Perfluorohexanesulfonic acid (PFHxS)	10	2.0	0.77	ng/L	1		SOP 434-PFAAS	11/16/20	11/23/20 22:50	JFC
Perfluoroheptanoic acid (PFHpA)	11	2.0	0.53	ng/L	1		SOP 434-PFAAS	11/16/20	11/23/20 22:50	JFC
Perfluoroheptanesulfonic acid (PFHpS)	ND	2.0	1.0	ng/L	1	U	SOP 434-PFAAS	11/16/20	11/23/20 22:50	JFC
Perfluorooctanoic acid (PFOA)	13	2.0	0.71	ng/L	1		SOP 434-PFAAS	11/16/20	11/23/20 22:50	JFC
Perfluorooctanesulfonic acid (PFOS)	49	2.0	0.68	ng/L	1		SOP 434-PFAAS	11/16/20	11/23/20 22:50	JFC
Perfluorooctanesulfonamide (FOSA)	ND	2.0	0.83	ng/L	1	U	SOP 434-PFAAS	11/16/20	11/23/20 22:50	JFC
6:2 Fluorotelomersulfonic acid (6:2FTS A)	38	2.0	0.39	ng/L	1		SOP 434-PFAAS	11/16/20	11/23/20 22:50	JFC
Perfluorononanoic acid (PFNA)	6.8	2.0	0.63	ng/L	1		SOP 434-PFAAS	11/16/20	11/23/20 22:50	JFC
Perfluorodecanoic acid (PFDA)	0.75	2.0	0.62	ng/L	1		SOP 434-PFAAS	11/16/20	11/23/20 22:50	JFC
Perfluorodecanesulfonic acid (PFDS)	ND	2.0	0.51	ng/L	1	U	SOP 434-PFAAS	11/16/20	11/23/20 22:50	JFC
N-EtFOSAA	ND	2.0	0.70	ng/L	1	U	SOP 434-PFAAS	11/16/20	11/23/20 22:50	JFC
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	2.0	1.1	ng/L	1	U	SOP 434-PFAAS	11/16/20	11/23/20 22:50	JFC
Perfluoroundecanoic acid (PFUnA)	ND	2.0	0.49	ng/L	1	U	SOP 434-PFAAS	11/16/20	11/23/20 22:50	JFC
N-MeFOSAA	ND	2.0	0.62	ng/L	1	U	SOP 434-PFAAS	11/16/20	11/23/20 22:50	JFC
Perfluorododecanoic acid (PFDoA)	ND	2.0	0.50	ng/L	1	U	SOP 434-PFAAS	11/16/20	11/23/20 22:50	JFC
Perfluorotridecanoic acid (PFTrDA)	ND	2.0	0.67	ng/L	1	U	SOP 434-PFAAS	11/16/20	11/23/20 22:50	JFC
Perfluorotetradecanoic acid (PFTA)	ND	2.0	0.50	ng/L	1	U	SOP 434-PFAAS	11/16/20	11/23/20 22:50	JFC

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
13C-PFHxA	86.8	70-130		11/23/20 22:50
13C-PFDA	105	70-130		11/23/20 22:50
d5-NEtFOSAA	99.8	70-130		11/23/20 22:50

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Hyannis, MA | Sample Description: | Work Order: 20K0392

Date Received: 11/9/2020

Field Sample #: RB-1 (s) | Sampled: 11/5/2020 10:35

Sample ID: 20K0392-02

Sample Matrix: Ground Water

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	3.3	2.0	0.64	ng/L	1		SOP 434-PFAAS	11/16/20	11/23/20 23:12	JFC
Perfluorobutanesulfonic acid (PFBS)	0.88	2.0	0.50	ng/L	1		SOP 434-PFAAS	11/16/20	11/23/20 23:12	JFC
Perfluoropentanoic acid (PFPeA)	7.8	2.0	0.42	ng/L	1		SOP 434-PFAAS	11/16/20	11/23/20 23:12	JFC
Perfluorohexanoic acid (PFHxA)	5.8	2.0	0.51	ng/L	1		SOP 434-PFAAS	11/16/20	11/23/20 23:12	JFC
Perfluorohexanesulfonic acid (PFHxS)	8.4	2.0	0.77	ng/L	1		SOP 434-PFAAS	11/16/20	11/23/20 23:12	JFC
Perfluoroheptanoic acid (PFHpA)	4.2	2.0	0.53	ng/L	1		SOP 434-PFAAS	11/16/20	11/23/20 23:12	JFC
Perfluoroheptanesulfonic acid (PFHpS)	ND	2.0	1.0	ng/L	1	U	SOP 434-PFAAS	11/16/20	11/23/20 23:12	JFC
Perfluorooctanoic acid (PFOA)	7.0	2.0	0.71	ng/L	1		SOP 434-PFAAS	11/16/20	11/23/20 23:12	JFC
Perfluorooctanesulfonic acid (PFOS)	38	2.0	0.68	ng/L	1		SOP 434-PFAAS	11/16/20	11/23/20 23:12	JFC
Perfluorooctanesulfonamide (FOSA)	ND	2.0	0.83	ng/L	1	U	SOP 434-PFAAS	11/16/20	11/23/20 23:12	JFC
6:2 Fluorotelomersulfonic acid (6:2FTS A)	ND	2.0	0.39	ng/L	1	U	SOP 434-PFAAS	11/16/20	11/23/20 23:12	JFC
Perfluorononanoic acid (PFNA)	4.7	2.0	0.63	ng/L	1		SOP 434-PFAAS	11/16/20	11/23/20 23:12	JFC
Perfluorodecanoic acid (PFDA)	ND	2.0	0.62	ng/L	1	U	SOP 434-PFAAS	11/16/20	11/23/20 23:12	JFC
Perfluorodecanesulfonic acid (PFDS)	ND	2.0	0.51	ng/L	1	U	SOP 434-PFAAS	11/16/20	11/23/20 23:12	JFC
N-EtFOSAA	ND	2.0	0.70	ng/L	1	U	SOP 434-PFAAS	11/16/20	11/23/20 23:12	JFC
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	2.0	1.1	ng/L	1	U	SOP 434-PFAAS	11/16/20	11/23/20 23:12	JFC
Perfluoroundecanoic acid (PFUnA)	ND	2.0	0.49	ng/L	1	U	SOP 434-PFAAS	11/16/20	11/23/20 23:12	JFC
N-MeFOSAA	ND	2.0	0.62	ng/L	1	U	SOP 434-PFAAS	11/16/20	11/23/20 23:12	JFC
Perfluorododecanoic acid (PFDoA)	ND	2.0	0.50	ng/L	1	U	SOP 434-PFAAS	11/16/20	11/23/20 23:12	JFC
Perfluorotridecanoic acid (PFTrDA)	ND	2.0	0.67	ng/L	1	U	SOP 434-PFAAS	11/16/20	11/23/20 23:12	JFC
Perfluorotetradecanoic acid (PFTA)	ND	2.0	0.50	ng/L	1	U	SOP 434-PFAAS	11/16/20	11/23/20 23:12	JFC

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
13C-PFHxA	85.2	70-130		11/23/20 23:12
13C-PFDA	102	70-130		11/23/20 23:12
d5-NEtFOSAA	106	70-130		11/23/20 23:12

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Hyannis, MA | Sample Description: | Work Order: 20K0392

Date Received: 11/9/2020

Field Sample #: OW-19 (m) | Sampled: 11/6/2020 11:20

Sample ID: 20K0392-03

Sample Matrix: Ground Water

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	33	2.0	0.64	ng/L	1		SOP 434-PFAAS	11/16/20	11/24/20 11:10	JFC
Perfluorobutanesulfonic acid (PFBS)	1.5	2.0	0.50	ng/L	1		SOP 434-PFAAS	11/16/20	11/24/20 11:10	JFC
Perfluoropentanoic acid (PFPeA)	130	20	4.2	ng/L	10		SOP 434-PFAAS	11/16/20	11/24/20 12:53	JFC
Perfluorohexanoic acid (PFHxA)	88	2.0	0.51	ng/L	1		SOP 434-PFAAS	11/16/20	11/24/20 11:10	JFC
Perfluorohexanesulfonic acid (PFHxS)	27	2.0	0.77	ng/L	1		SOP 434-PFAAS	11/16/20	11/24/20 11:10	JFC
Perfluoroheptanoic acid (PFHpA)	30	2.0	0.53	ng/L	1		SOP 434-PFAAS	11/16/20	11/24/20 11:10	JFC
Perfluoroheptanesulfonic acid (PFHpS)	ND	2.0	1.0	ng/L	1	U	SOP 434-PFAAS	11/16/20	11/24/20 11:10	JFC
Perfluorooctanoic acid (PFOA)	11	2.0	0.71	ng/L	1		SOP 434-PFAAS	11/16/20	11/24/20 11:10	JFC
Perfluorooctanesulfonic acid (PFOS)	47	2.0	0.68	ng/L	1		SOP 434-PFAAS	11/16/20	11/24/20 11:10	JFC
Perfluorooctanesulfonamide (FOSA)	ND	2.0	0.83	ng/L	1	U	SOP 434-PFAAS	11/16/20	11/24/20 11:10	JFC
6:2 Fluorotelomersulfonic acid (6:2FTS A)	0.95	2.0	0.39	ng/L	1		SOP 434-PFAAS	11/16/20	11/24/20 11:10	JFC
Perfluorononanoic acid (PFNA)	2.0	2.0	0.63	ng/L	1		SOP 434-PFAAS	11/16/20	11/24/20 11:10	JFC
Perfluorodecanoic acid (PFDA)	ND	2.0	0.62	ng/L	1	U	SOP 434-PFAAS	11/16/20	11/24/20 11:10	JFC
Perfluorodecanesulfonic acid (PFDS)	ND	2.0	0.51	ng/L	1	U	SOP 434-PFAAS	11/16/20	11/24/20 11:10	JFC
N-EtFOSAA	ND	2.0	0.70	ng/L	1	U	SOP 434-PFAAS	11/16/20	11/24/20 11:10	JFC
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	2.0	1.1	ng/L	1	U	SOP 434-PFAAS	11/16/20	11/24/20 11:10	JFC
Perfluoroundecanoic acid (PFUnA)	ND	2.0	0.49	ng/L	1	U	SOP 434-PFAAS	11/16/20	11/24/20 11:10	JFC
N-MeFOSAA	ND	2.0	0.62	ng/L	1	U	SOP 434-PFAAS	11/16/20	11/24/20 11:10	JFC
Perfluorododecanoic acid (PFDoA)	ND	2.0	0.50	ng/L	1	U	SOP 434-PFAAS	11/16/20	11/24/20 11:10	JFC
Perfluorotridecanoic acid (PFTrDA)	2.9	2.0	0.67	ng/L	1		SOP 434-PFAAS	11/16/20	11/24/20 11:10	JFC
Perfluorotetradecanoic acid (PFTA)	ND	2.0	0.50	ng/L	1	U	SOP 434-PFAAS	11/16/20	11/24/20 11:10	JFC

Surrogates	% Recovery		Recovery Limits	Flag/Qual	
13C-PFHxA	106		70-130		11/24/20 11:10
13C-PFHxA		*	70-130	S-01, U	11/24/20 12:53
13C-PFDA	115		70-130		11/24/20 11:10
13C-PFDA		*	70-130	S-01, U	11/24/20 12:53
d5-NEtFOSAA	104		70-130		11/24/20 11:10
d5-NEtFOSAA		*	70-130	S-01, U	11/24/20 12:53

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Hyannis, MA | Sample Description: | Work Order: 20K0392

Date Received: 11/9/2020

Field Sample #: OW-19 (s) | Sampled: 11/6/2020 12:05

Sample ID: 20K0392-04

Sample Matrix: Ground Water

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	3.5	2.0	0.64	ng/L	1		SOP 434-PFAAS	11/16/20	11/24/20 11:32	JFC
Perfluorobutanesulfonic acid (PFBS)	1.8	2.0	0.50	ng/L	1		SOP 434-PFAAS	11/16/20	11/24/20 11:32	JFC
Perfluoropentanoic acid (PFPeA)	9.3	2.0	0.42	ng/L	1		SOP 434-PFAAS	11/16/20	11/24/20 11:32	JFC
Perfluorohexanoic acid (PFHxA)	7.7	2.0	0.51	ng/L	1		SOP 434-PFAAS	11/16/20	11/24/20 11:32	JFC
Perfluorohexanesulfonic acid (PFHxS)	3.1	2.0	0.77	ng/L	1		SOP 434-PFAAS	11/16/20	11/24/20 11:32	JFC
Perfluoroheptanoic acid (PFHpA)	4.2	2.0	0.53	ng/L	1		SOP 434-PFAAS	11/16/20	11/24/20 11:32	JFC
Perfluoroheptanesulfonic acid (PFHpS)	ND	2.0	1.0	ng/L	1	U	SOP 434-PFAAS	11/16/20	11/24/20 11:32	JFC
Perfluorooctanoic acid (PFOA)	11	2.0	0.71	ng/L	1		SOP 434-PFAAS	11/16/20	11/24/20 11:32	JFC
Perfluorooctanesulfonic acid (PFOS)	25	2.0	0.68	ng/L	1		SOP 434-PFAAS	11/16/20	11/24/20 11:32	JFC
Perfluorooctanesulfonamide (FOSA)	ND	2.0	0.83	ng/L	1	U	SOP 434-PFAAS	11/16/20	11/24/20 11:32	JFC
6:2 Fluorotelomersulfonic acid (6:2FTS A)	ND	2.0	0.39	ng/L	1	U	SOP 434-PFAAS	11/16/20	11/24/20 11:32	JFC
Perfluorononanoic acid (PFNA)	2.4	2.0	0.63	ng/L	1		SOP 434-PFAAS	11/16/20	11/24/20 11:32	JFC
Perfluorodecanoic acid (PFDA)	2.7	2.0	0.62	ng/L	1		SOP 434-PFAAS	11/16/20	11/24/20 11:32	JFC
Perfluorodecanesulfonic acid (PFDS)	ND	2.0	0.51	ng/L	1	U	SOP 434-PFAAS	11/16/20	11/24/20 11:32	JFC
N-EtFOSAA	ND	2.0	0.70	ng/L	1	U	SOP 434-PFAAS	11/16/20	11/24/20 11:32	JFC
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	2.0	1.1	ng/L	1	U	SOP 434-PFAAS	11/16/20	11/24/20 11:32	JFC
Perfluoroundecanoic acid (PFUnA)	ND	2.0	0.49	ng/L	1	U	SOP 434-PFAAS	11/16/20	11/24/20 11:32	JFC
N-MeFOSAA	ND	2.0	0.62	ng/L	1	U	SOP 434-PFAAS	11/16/20	11/24/20 11:32	JFC
Perfluorododecanoic acid (PFDoA)	ND	2.0	0.50	ng/L	1	U	SOP 434-PFAAS	11/16/20	11/24/20 11:32	JFC
Perfluorotridecanoic acid (PFTrDA)	ND	2.0	0.67	ng/L	1	U	SOP 434-PFAAS	11/16/20	11/24/20 11:32	JFC
Perfluorotetradecanoic acid (PFTA)	ND	2.0	0.50	ng/L	1	U	SOP 434-PFAAS	11/16/20	11/24/20 11:32	JFC

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
13C-PFHxA	102	70-130		11/24/20 11:32
13C-PFDA	120	70-130		11/24/20 11:32
d5-NEtFOSAA	119	70-130		11/24/20 11:32

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Hyannis, MA | Sample Description: | Work Order: 20K0392

Date Received: 11/9/2020

Field Sample #: HW-Q (s) | Sampled: 11/6/2020 14:00

Sample ID: 20K0392-05

Sample Matrix: Ground Water

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	1.8	2.0	0.64	ng/L	1		SOP 434-PFAAS	11/16/20	11/24/20 11:53	JFC
Perfluorobutanesulfonic acid (PFBS)	ND	2.0	0.50	ng/L	1	U	SOP 434-PFAAS	11/16/20	11/24/20 11:53	JFC
Perfluoropentanoic acid (PFPeA)	4.7	2.0	0.42	ng/L	1		SOP 434-PFAAS	11/16/20	11/24/20 11:53	JFC
Perfluorohexanoic acid (PFHxA)	3.6	2.0	0.51	ng/L	1		SOP 434-PFAAS	11/16/20	11/24/20 11:53	JFC
Perfluorohexanesulfonic acid (PFHxS)	8.7	2.0	0.77	ng/L	1		SOP 434-PFAAS	11/16/20	11/24/20 11:53	JFC
Perfluoroheptanoic acid (PFHpA)	2.1	2.0	0.53	ng/L	1		SOP 434-PFAAS	11/16/20	11/24/20 11:53	JFC
Perfluoroheptanesulfonic acid (PFHpS)	ND	2.0	1.0	ng/L	1	U	SOP 434-PFAAS	11/16/20	11/24/20 11:53	JFC
Perfluorooctanoic acid (PFOA)	6.2	2.0	0.71	ng/L	1		SOP 434-PFAAS	11/16/20	11/24/20 11:53	JFC
Perfluorooctanesulfonic acid (PFOS)	7.5	2.0	0.68	ng/L	1		SOP 434-PFAAS	11/16/20	11/24/20 11:53	JFC
Perfluorooctanesulfonamide (FOSA)	ND	2.0	0.83	ng/L	1	U	SOP 434-PFAAS	11/16/20	11/24/20 11:53	JFC
6:2 Fluorotelomersulfonic acid (6:2FTS A)	ND	2.0	0.39	ng/L	1	U	SOP 434-PFAAS	11/16/20	11/24/20 11:53	JFC
Perfluorononanoic acid (PFNA)	ND	2.0	0.63	ng/L	1	U	SOP 434-PFAAS	11/16/20	11/24/20 11:53	JFC
Perfluorodecanoic acid (PFDA)	ND	2.0	0.62	ng/L	1	U	SOP 434-PFAAS	11/16/20	11/24/20 11:53	JFC
Perfluorodecanesulfonic acid (PFDS)	ND	2.0	0.51	ng/L	1	U	SOP 434-PFAAS	11/16/20	11/24/20 11:53	JFC
N-EtFOSAA	ND	2.0	0.70	ng/L	1	U	SOP 434-PFAAS	11/16/20	11/24/20 11:53	JFC
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	2.0	1.1	ng/L	1	U	SOP 434-PFAAS	11/16/20	11/24/20 11:53	JFC
Perfluoroundecanoic acid (PFUnA)	ND	2.0	0.49	ng/L	1	U	SOP 434-PFAAS	11/16/20	11/24/20 11:53	JFC
N-MeFOSAA	ND	2.0	0.62	ng/L	1	U	SOP 434-PFAAS	11/16/20	11/24/20 11:53	JFC
Perfluorododecanoic acid (PFDoA)	ND	2.0	0.50	ng/L	1	U	SOP 434-PFAAS	11/16/20	11/24/20 11:53	JFC
Perfluorotridecanoic acid (PFTrDA)	ND	2.0	0.67	ng/L	1	U	SOP 434-PFAAS	11/16/20	11/24/20 11:53	JFC
Perfluorotetradecanoic acid (PFTA)	ND	2.0	0.50	ng/L	1	U	SOP 434-PFAAS	11/16/20	11/24/20 11:53	JFC

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
13C-PFHxA	99.2	70-130		11/24/20 11:53
13C-PFDA	109	70-130		11/24/20 11:53
d5-NEtFOSAA	112	70-130		11/24/20 11:53

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Sample Extraction Data

Prep Method: SOP 434-PFAAS **Analytical Method: SOP 434-PFAAS**

Lab Number [Field ID]	Batch	Initial [mL]	Final [mL]	Date
20K0392-01 [RB-1 (m)]	B270970	250	1.00	11/16/20
20K0392-02 [RB-1 (s)]	B270970	250	1.00	11/16/20
20K0392-03 [OW-19 (m)]	B270970	250	1.00	11/16/20
20K0392-03RE1 [OW-19 (m)]	B270970	250	1.00	11/16/20
20K0392-04 [OW-19 (s)]	B270970	250	1.00	11/16/20
20K0392-05 [HW-Q (s)]	B270970	250	1.00	11/16/20

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QUALITY CONTROL

Semivolatile Organic Compounds by - LC/MS-MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B270970 - SOP 434-PFAAS										
Blank (B270970-BLK1)				Prepared: 11/16/20 Analyzed: 11/23/20						
Perfluorobutanoic acid (PFBA)	ND	2.0	ng/L							U
Perfluorobutanesulfonic acid (PFBS)	ND	2.0	ng/L							U
Perfluoropentanoic acid (PFPeA)	ND	2.0	ng/L							U
Perfluorohexanoic acid (PFHxA)	ND	2.0	ng/L							U
Perfluorohexanesulfonic acid (PFHxS)	ND	2.0	ng/L							U
Perfluoroheptanoic acid (PFHpA)	ND	2.0	ng/L							U
Perfluoroheptanesulfonic acid (PFHpS)	ND	2.0	ng/L							U
Perfluorooctanoic acid (PFOA)	ND	2.0	ng/L							U
Perfluorooctanesulfonic acid (PFOS)	ND	2.0	ng/L							U
Perfluorooctanesulfonamide (FOSA)	ND	2.0	ng/L							U
6:2 Fluorotelomersulfonic acid (6:2FTS A)	ND	2.0	ng/L							U
Perfluorononanoic acid (PFNA)	ND	2.0	ng/L							U
Perfluorodecanoic acid (PFDA)	ND	2.0	ng/L							U
Perfluorodecanesulfonic acid (PFDS)	ND	2.0	ng/L							U
N-EtFOSAA	ND	2.0	ng/L							U
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	2.0	ng/L							U
Perfluoroundecanoic acid (PFUnA)	ND	2.0	ng/L							U
N-MeFOSAA	ND	2.0	ng/L							U
Perfluorododecanoic acid (PFDoA)	ND	2.0	ng/L							U
Perfluorotridecanoic acid (PFTrDA)	ND	2.0	ng/L							U
Perfluorotetradecanoic acid (PFTA)	ND	2.0	ng/L							U
Surrogate: 13C-PFHxA	*35.6*		ng/L	40.0		89.0	70-130			
Surrogate: 13C-PFDA	*40.8*		ng/L	40.0		102	70-130			
Surrogate: d5-NEtFOSAA	*158*		ng/L	160		98.9	70-130			
LCS (B270970-BS1)				Prepared: 11/16/20 Analyzed: 11/23/20						
Perfluorobutanoic acid (PFBA)	9.51	2.0	ng/L	10.0		95.1	70-130			
Perfluorobutanesulfonic acid (PFBS)	8.77	2.0	ng/L	8.85		99.1	70-130			
Perfluoropentanoic acid (PFPeA)	10.2	2.0	ng/L	10.0		102	70-130			
Perfluorohexanoic acid (PFHxA)	9.07	2.0	ng/L	10.0		90.7	70-130			
Perfluorohexanesulfonic acid (PFHxS)	8.94	2.0	ng/L	9.10		98.3	70-130			
Perfluoroheptanoic acid (PFHpA)	9.48	2.0	ng/L	10.0		94.8	70-130			
Perfluoroheptanesulfonic acid (PFHpS)	9.80	2.0	ng/L	9.50		103	70-130			
Perfluorooctanoic acid (PFOA)	11.1	2.0	ng/L	10.0		111	70-130			
Perfluorooctanesulfonic acid (PFOS)	8.99	2.0	ng/L	9.25		97.2	70-130			
Perfluorooctanesulfonamide (FOSA)	10.6	2.0	ng/L	10.0		106	70-130			
6:2 Fluorotelomersulfonic acid (6:2FTS A)	9.78	2.0	ng/L	9.50		103	70-130			
Perfluorononanoic acid (PFNA)	11.9	2.0	ng/L	10.0		119	70-130			
Perfluorodecanoic acid (PFDA)	11.2	2.0	ng/L	10.0		112	70-130			
Perfluorodecanesulfonic acid (PFDS)	8.69	2.0	ng/L	9.65		90.1	70-130			
N-EtFOSAA	12.7	2.0	ng/L	10.0		127	70-130			
8:2 Fluorotelomersulfonic acid (8:2FTS A)	11.5	2.0	ng/L	9.60		120	70-130			
Perfluoroundecanoic acid (PFUnA)	11.9	2.0	ng/L	10.0		119	70-130			
N-MeFOSAA	10.1	2.0	ng/L	10.0		101	70-130			
Perfluorododecanoic acid (PFDoA)	10.5	2.0	ng/L	10.0		105	70-130			
Perfluorotridecanoic acid (PFTrDA)	10.8	2.0	ng/L	10.0		108	70-130			
Perfluorotetradecanoic acid (PFTA)	10.4	2.0	ng/L	10.0		104	70-130			
Surrogate: 13C-PFHxA	*39.2*		ng/L	40.0		98.0	70-130			
Surrogate: 13C-PFDA	*45.6*		ng/L	40.0		114	70-130			
Surrogate: d5-NEtFOSAA	*178*		ng/L	160		111	70-130			

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FLAG/QUALIFIER SUMMARY

*	QC result is outside of established limits.
†	Wide recovery limits established for difficult compound.
‡	Wide RPD limits established for difficult compound.
#	Data exceeded client recommended or regulatory level
ND	Not Detected
RL	Reporting Limit is at the level of quantitation (LOQ)
DL	Detection Limit is the lower limit of detection determined by the MDL study
MCL	Maximum Contaminant Level
	Percent recoveries and relative percent differences (RPDs) are determined by the software using values in the calculation which have not been rounded.
	No results have been blank subtracted unless specified in the case narrative section.
S-01	The surrogate recovery for this sample is not available due to sample dilution below the surrogate reporting limit required from high analyte concentration and/or matrix interferences.
U	Analyte included in the analysis, but not detected

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CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
SOP 434-PFAAS in Water	
Perfluorobutanoic acid (PFBA)	NH-P
Perfluorobutanesulfonic acid (PFBS)	NH-P
Perfluoropentanoic acid (PFPeA)	NH-P
Perfluorohexanoic acid (PFHxA)	NH-P
Perfluorohexanesulfonic acid (PFHxS)	NH-P
Perfluoroheptanoic acid (PFHpA)	NH-P
Perfluorooctanoic acid (PFOA)	NH-P
Perfluorooctanesulfonic acid (PFOS)	NH-P
6:2 Fluorotelomersulfonic acid (6:2FTS A)	NH-P
Perfluorononanoic acid (PFNA)	NH-P
Perfluorodecanoic acid (PFDA)	NH-P
N-EtFOSAA	NH-P
8:2 Fluorotelomersulfonic acid (8:2FTS A)	NH-P
Perfluoroundecanoic acid (PFUnA)	NH-P
N-MeFOSAA	NH-P
Perfluorododecanoic acid (PFDoA)	NH-P
Perfluorotridecanoic acid (PFTrDA)	NH-P
Perfluorotetradecanoic acid (PFTA)	NH-P

The CON-TEST Environmental Laboratory operates under the following certifications and accreditations:

Code	Description	Number	Expires
AIHA	AIHA-LAP, LLC - ISO17025:2017	100033	03/1/2022
MA	Massachusetts DEP	M-MA100	06/30/2021
CT	Connecticut Department of Publilc Health	PH-0567	09/30/2021
NY	New York State Department of Health	10899 NELAP	04/1/2021
NH-S	New Hampshire Environmental Lab	2516 NELAP	02/5/2021
RI	Rhode Island Department of Health	LAO00112	12/30/2020
NC	North Carolina Div. of Water Quality	652	12/31/2020
NJ	New Jersey DEP	MA007 NELAP	06/30/2021
FL	Florida Department of Health	E871027 NELAP	06/30/2021
VT	Vermont Department of Health Lead Laboratory	LL015036	07/30/2021
ME	State of Maine	2011028	06/9/2021
VA	Commonwealth of Virginia	460217	12/14/2020
NH-P	New Hampshire Environmental Lab	2557 NELAP	09/6/2021
VT-DW	Vermont Department of Health Drinking Water	VT-255716	06/12/2021
NC-DW	North Carolina Department of Health	25703	07/31/2021
PA	Commonwealth of Pennsylvania DEP	68-05812	06/30/2021
MI	Dept. of Env, Great Lakes, and Energy	9100	09/6/2021

20L0392

con-test ANALYTICAL LABORATORY

Phone: 413-525-2332
Fax: 413-525-6405
Email: info@contestlabs.com

http://www.contestlabs.com

CHAIN OF CUSTODY RECORD

39 Spruce Street
East Longmeadow, MA 01028

Doc # 381 Rev 2_06262019

Page 1 of 1

Company Name: Horsley Witten Group
Address: 90 Rte 6A Sandwich MA 02563
Phone: (508) 833-6600
Project Name:
Project Location: Hyannis, MA
Project Number: 20102
Project Manager: Bryan Massa
Con-Test Quote Name/Number:
Invoice Recipient:
Sampled By: HW

Requested Turnaround Time:
7-Day ☐ 10-Day ☐
PFAS 10-Day (std) ☑ Due Date:

Rush Approval Required:
1-Day ☐ 3-Day ☐
2-Day ☐ 4-Day ☐

Dissolved Metals Samples:
○ Field Filtered
○ Lab to Filter

Orthophosphate Samples:
○ Field Filtered
○ Lab to Filter

Data Delivery:
Format: PDF ☑ EXCEL ☑
Other:
CLP Like Data Pkg Required: ☐
Email To: bmassa@horsleywitten.com
Fax To #:

ANALYSIS REQUESTED

Con-Test Work Order#	Client Sample ID / Description	Beginning Date/Time	Ending Date/Time	COMP/GRAB	[1]Matrix Code	Conc Code	VIALS	GLASS	PLASTIC	BACTERIA	ENCORE	PFAS-All
1	RB-1(m)	11/5/20	10:00	~~Grab~~ Grab	GW				✓			✓
2	RB-1(s)	11/5/20	10:35	Grab	GW				✓			✓
3	OW-19(m)	11/6/20	11:20	Grab	GW				✓			✓
4	OW-19(s)	11/6/20	12:05	Grab	GW				✓			✓
5	HW-2(s)	11/6/20	14:00	Grab	GW				✓			✓

[2] Preservation Code

Container ID's (if any)

Total Number Of:
VIALS
GLASS
PLASTIC 10
BACTERIA
ENCORE

Glassware in the fridge? (Y) N
Glassware in freezer? Y / N
Prepackaged Cooler? Y / N

*Contest is not responsible for missing samples from prepacked coolers

[1] Matrix Codes:
GW = Ground Water
WW = Waste Water
DW = Drinking Water
A = Air
S = Soil
SL = Sludge
SOL = Solid
O = Other (please define)

[2] Preservation Codes:
I = Iced
H = HCL
M = Methanol
N = Nitric Acid
S = Sulfuric Acid
B = Sodium Bisulfate
X = Sodium Hydroxide
T = Sodium Thiosulfate
O = Other (please define)

Relinquished by: (signature)	Date/Time:
Sarah Bartlett	11/9/20 14:25
Received by: (signature) Paul Charteway	Date/Time: 11-9-20 1425
Relinquished by: (signature) Paul Charteway	Date/Time: 11-9-20 1655
Received by: (signature)	Date/Time: 11/9/20 1700
Relinquished by: (signature)	Date/Time: 11/9/20 1925
Received by: (signature)	Date/Time: 11/9/20 1925
Relinquished by: (signature)	Date/Time:
Received by: (signature)	Date/Time:

Client Comments:

Detection Limit Requirements:
MA GW-1

Special Requirements:
☑ MA MCP Required
☐ MCP Certification Form Required
☐ CT RCP Required
RCP Certification Form Required
☐ MA State DW Required
PWSID #

Please use the following codes to indicate possible sample concentration within the Conc Code column above:
H - High; M - Medium; L - Low; C - Clean; U - Unknown

NELAC and AIHA-LAP, LLC Accredited

Project Entity:
Government ☐ Municipality ☐ MWRA ☐ WRTA ☐
Federal ☐ 21 J ☐ School ☐
City ☐ Brownfield ☐ MBTA ☐

Other:
☐ Chromatogram
☐ AIHA-LAP,LLC

PCB ONLY:
☐ Soxhlet
☐ Non Soxhlet

Comments:

Disclaimer: Con-Test Labs is not responsible for any omitted information on the Chain of Custody. The Chain of Custody is a legal document that must be complete and accurate and is used to determine what analyses the laboratory will perform. Any missing information is not the laboratory's responsibility. Con-Test values your partnership on each project and will try to assist with missing information, but will not be held accountable.

Table of Contents

I Have Not Confirmed Sample Container Numbers With Lab Staff Before Relinquishing Over Samples_____

con-test® ANALYTICAL LABORATORY

Doc# 277 Rev 5 2017

Login Sample Receipt Checklist - (Rejection Criteria Listing - Using Acceptance Policy) Any False Statement will be brought to the attention of the Client - State True or False

Client Hasley Witten

Received By [signature] Date 11/4/20 Time 1925

How were the samples received? In Cooler T No Cooler _____ On Ice T No Ice _____ Direct from Sampling _____ Ambient _____ Melted Ice _____

Were samples within Temperature? 2-6°C T By Gun # 3 Actual Temp - 3.8 By Blank # _____ Actual Temp - _____

Was Custody Seal Intact? n/a Were Samples Tampered with? n/a

Was COC Relinquished ? T Does Chain Agree With Samples? T

Are there broken/leaking/loose caps on any samples? F

Is COC in ink/ Legible? T Were samples received within holding time? T

Did COC include all pertinent Information? Client T Analysis T Sampler Name T Project T ID's T Collection Dates/Times T

Are Sample labels filled out and legible? T

Are there Lab to Filters? F Who was notified? _____

Are there Rushes? F Who was notified? _____

Are there Short Holds? F Who was notified? _____

Is there enough Volume? T

Is there Headspace where applicable? n/a MS/MSD? F

Proper Media/Containers Used? T Is splitting samples required? F

Were trip blanks received? F On COC? F

Do all samples have the proper pH? Acid n/a Base n/a

Vials	#	Containers:	#		#		#
Unp-		1 Liter Amb.		1 Liter Plastic		16 oz Amb.	
HCL-		500 mL Amb.		500 mL Plastic		8oz Amb/Clear	
Meoh-		250 mL Amb.		250 mL Plastic	ID	4oz Amb/Clear	
Bisulfate-		Flashpoint		Col./Bacteria		2oz Amb/Clear	
DI-		Other Glass		Other Plastic		Encore	
Thiosulfate-		SOC Kit		Plastic Bag		Frozen:	
Sulfuric-		Perchlorate		Ziplock			

Unused Media

Vials	#	Containers:	#		#		#
Unp-		1 Liter Amb.		1 Liter Plastic		16 oz Amb.	
HCL-		500 mL Amb.		500 mL Plastic		8oz Amb/Clear	
Meoh-		250 mL Amb.		250 mL Plastic		4oz Amb/Clear	
Bisulfate-		Col./Bacteria		Flashpoint		2oz Amb/Clear	
DI-		Other Plastic		Other Glass		Encore	
Thiosulfate-		SOC Kit		Plastic Bag		Frozen:	
Sulfuric-		Perchlorate		Ziplock			

Comments:

ANALYTICAL REPORT

Lab Number:	L2043919
Client:	Horseley & Witten, Inc. Sextant Hill Office Park 90 Route 6A Sandwich, MA 02563
ATTN:	Brian Massa
Phone:	(508) 833-6600
Project Name:	BARNSTABLE AIRPORT
Project Number:	20102
Report Date:	10/27/20

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Certifications & Approvals: MA (M-MA086), NH NELAP (2064), CT (PH-0574), IL (200077), ME (MA00086), MD (348), NJ (MA935), NY (11148), NC (25700/666), PA (68-03671), RI (LAO00065), TX (T104704476), VT (VT-0935), VA (460195), USDA (Permit #P330-17-00196).

Eight Walkup Drive, Westborough, MA 01581-1019
508-898-9220 (Fax) 508-898-9193 800-624-9220 - www.alphalab.com

Project Name: BARNSTABLE AIRPORT
Project Number: 20102

Lab Number: L2043919
Report Date: 10/27/20

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L2043919-01	DL22(6-8)	SOIL	HYANNIS MA	09/25/20 12:51	09/28/20
L2043919-02	DL22(18-20)	SOIL	HYANNIS MA	09/25/20 12:57	09/28/20

Project Name: BARNSTABLE AIRPORT **Lab Number:** L2043919

Project Number: 20102 **Report Date:** 10/27/20

MADEP MCP Response Action Analytical Report Certification

This form provides certifications for all samples performed by MCP methods. Please refer to the Sample Results and Container Information sections of this report for specification of MCP methods used for each analysis. The following questions pertain only to MCP Analytical Methods.

An affirmative response to questions A through F is required for "Presumptive Certainty" status		
A	Were all samples received in a condition consistent with those described on the Chain-of-Custody, properly preserved (including temperature) in the field or laboratory, and prepared/analyzed within method holding times?	YES
B	Were the analytical method(s) and all associated QC requirements specified in the selected CAM protocol(s) followed?	N/A
C	Were all required corrective actions and analytical response actions specified in the selected CAM protocol(s) implemented for all identified performance standard non-conformances?	N/A
D	Does the laboratory report comply with all the reporting requirements specified in CAM VII A, "Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data?"	YES
E a.	VPH, EPH, and APH Methods only: Was each method conducted without significant modification(s)? (Refer to the individual method(s) for a list of significant modifications).	N/A
E b.	APH and TO-15 Methods only: Was the complete analyte list reported for each method?	N/A
F	Were all applicable CAM protocol QC and performance standard non-conformances identified and evaluated in a laboratory narrative (including all "No" responses to Questions A through E)?	N/A

A response to questions G, H and I is required for "Presumptive Certainty" status		
G	Were the reporting limits at or below all CAM reporting limits specified in the selected CAM protocol(s)?	N/A
H	Were all QC performance standards specified in the CAM protocol(s) achieved?	N/A
I	Were results reported for the complete analyte list specified in the selected CAM protocol(s)?	N/A

For any questions answered "No", please refer to the case narrative section on the following page(s).

Please note that sample matrix information is located in the Sample Results section of this report.

Project Name:	BARNSTABLE AIRPORT	**Lab Number:**	L2043919
Project Number:	20102	**Report Date:**	10/27/20

Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet NELAP requirements for all NELAP accredited parameters unless otherwise noted in the following narrative. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively.

When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances, the specific failure is not narrated but noted in the associated QC Outlier Summary Report, located directly after the Case Narrative. QC information is also incorporated in the Data Usability Assessment table (Format 11) of our Data Merger tool, where it can be reviewed in conjunction with the sample result, associated regulatory criteria and any associated data usability implications.

Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

HOLD POLICY - For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Alpha Project Manager and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Project Management at 800-624-9220 with any questions.

Project Name: BARNSTABLE AIRPORT **Lab Number:** L2043919
Project Number: 20102 **Report Date:** 10/27/20

Case Narrative (continued)

Report Submission

All non-detect (ND) or estimated concentrations (J-qualified) have been quantitated to the limit noted in the MDL column.

MCP Related Narratives

All MCP required questions were answered with affirmative responses where applicable; therefore, there are no relevant protocol-specific QC and/or performance standard non-conformances to report.

Non-MCP Related Narratives

Perfluorinated Alkyl Acids by Isotope Dilution

L2043919-01, -02 and -02RE: Extracted Internal Standard recoveries were outside the acceptance criteria for individual analytes. Please refer to the surrogate section of the report for details.

L2043919-02RE: The sample has elevated detection limits due to the limited sample volume utilized during extraction, as required by the sample matrix.

L2043919-02: The surrogate recoveries were outside the acceptance criteria for n-deuteriomethylperfluoro-1-octanesulfonamidoacetic acid (d3-nmefosaa) (0%); however, the criteria were achieved upon re-extraction outside of holding time. The results of both extractions are reported; however, all associated compounds are considered to have a potential bias.

WG1426973-1: The sample was re-analyzed due to QC failures in the original analysis. The results of the re-analysis are reported.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature: Elizabeth Porta

Title: Technical Director/Representative Date: 10/27/20

QC OUTLIER SUMMARY REPORT

Project Name: BARNSTABLE AIRPORT
Project Number: 20102

Lab Number: L2043919
Report Date: 10/27/20

Method	Client ID (Native ID)	Lab ID	Parameter	QC Type	Recovery/RPD (%)	QC Limits (%)	Associated Samples	Data Quality Assessment

ORGANICS

SEMIVOLATILES

Project Name: BARNSTABLE AIRPORT **Lab Number:** L2043919

Project Number: 20102 **Report Date:** 10/27/20

SAMPLE RESULTS

Lab ID: L2043919-01
Client ID: DL22(6-8)
Sample Location: HYANNIS MA

Date Collected: 09/25/20 12:51
Date Received: 09/28/20
Field Prep: Not Specified

Sample Depth:
Matrix: Soil
Analytical Method: 134,LCMSMS-ID
Analytical Date: 10/08/20 15:16
Analyst: SG
Percent Solids: 97%

Extraction Method: ALPHA 23528
Extraction Date: 10/05/20 12:45

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						
Perfluorobutanoic Acid (PFBA)	0.031	J	ng/g	1.00	0.023	1
Perfluoropentanoic Acid (PFPeA)	0.118	J	ng/g	1.00	0.046	1
Perfluorobutanesulfonic Acid (PFBS)	ND		ng/g	1.00	0.039	1
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	ND		ng/g	1.00	0.065	1
Perfluorohexanoic Acid (PFHxA)	0.104	J	ng/g	1.00	0.053	1
Perfluoropentanesulfonic Acid (PFPeS)	ND		ng/g	1.00	0.084	1
Perfluoroheptanoic Acid (PFHpA)	0.481	J	ng/g	1.00	0.045	1
Perfluorohexanesulfonic Acid (PFHxS)	0.070	J	ng/g	1.00	0.061	1
Perfluorooctanoic Acid (PFOA)	1.32		ng/g	1.00	0.042	1
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	11.7		ng/g	1.00	0.180	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		ng/g	1.00	0.136	1
Perfluorononanoic Acid (PFNA)	2.66		ng/g	1.00	0.075	1
Perfluorooctanesulfonic Acid (PFOS)	8.85		ng/g	1.00	0.130	1
Perfluorodecanoic Acid (PFDA)	0.383	J	ng/g	1.00	0.067	1
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	15.3		ng/g	1.00	0.287	1
Perfluorononanesulfonic Acid (PFNS)	ND		ng/g	1.00	0.299	1
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND		ng/g	1.00	0.202	1
Perfluoroundecanoic Acid (PFUnA)	0.971	J	ng/g	1.00	0.047	1
Perfluorodecanesulfonic Acid (PFDS)	ND		ng/g	1.00	0.153	1
Perfluorooctanesulfonamide (FOSA)	ND		ng/g	1.00	0.098	1
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND		ng/g	1.00	0.085	1
Perfluorododecanoic Acid (PFDoA)	ND		ng/g	1.00	0.070	1
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/g	1.00	0.204	1
Perfluorotetradecanoic Acid (PFTA)	ND		ng/g	1.00	0.054	1

Project Name: BARNSTABLE AIRPORT **Lab Number:** L2043919

Project Number: 20102 **Report Date:** 10/27/20

SAMPLE RESULTS

Lab ID: L2043919-01 Date Collected: 09/25/20 12:51

Client ID: DL22(6-8) Date Received: 09/28/20

Sample Location: HYANNIS MA Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor

Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab

Surrogate (Extracted Internal Standard)	% Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	82		60-153
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	87		65-182
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	98		70-151
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	95		56-138
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	81		61-147
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	86		62-149
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	107		63-166
Perfluoro[13C8]Octanoic Acid (M8PFOA)	84		62-152
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	82		32-182
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	89		61-154
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	98		65-151
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	88		65-150
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	91		25-186
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	**10**	Q	45-137
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	94		64-158
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	44		1-125
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	**5**	Q	42-136
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	84		56-148
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	46		26-160

Project Name: BARNSTABLE AIRPORT **Lab Number:** L2043919

Project Number: 20102 **Report Date:** 10/27/20

SAMPLE RESULTS

Lab ID: L2043919-02
Client ID: DL22(18-20)
Sample Location: HYANNIS MA

Date Collected: 09/25/20 12:57
Date Received: 09/28/20
Field Prep: Not Specified

Sample Depth:
Matrix: Soil
Analytical Method: 134,LCMSMS-ID
Analytical Date: 10/08/20 15:34
Analyst: SG
Percent Solids: 98%

Extraction Method: ALPHA 23528
Extraction Date: 10/05/20 12:45

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						
Perfluorobutanoic Acid (PFBA)	ND		ng/g	0.977	0.022	1
Perfluoropentanoic Acid (PFPeA)	0.049	J	ng/g	0.977	0.045	1
Perfluorobutanesulfonic Acid (PFBS)	ND		ng/g	0.977	0.038	1
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	ND		ng/g	0.977	0.063	1
Perfluorohexanoic Acid (PFHxA)	0.074	J	ng/g	0.977	0.051	1
Perfluoropentanesulfonic Acid (PFPeS)	ND		ng/g	0.977	0.082	1
Perfluoroheptanoic Acid (PFHpA)	0.073	J	ng/g	0.977	0.044	1
Perfluorohexanesulfonic Acid (PFHxS)	ND		ng/g	0.977	0.059	1
Perfluorooctanoic Acid (PFOA)	0.176	J	ng/g	0.977	0.041	1
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	2.67		ng/g	0.977	0.175	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		ng/g	0.977	0.133	1
Perfluorononanoic Acid (PFNA)	0.476	J	ng/g	0.977	0.073	1
Perfluorooctanesulfonic Acid (PFOS)	1.18		ng/g	0.977	0.127	1
Perfluorodecanoic Acid (PFDA)	ND		ng/g	0.977	0.065	1
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	6.39		ng/g	0.977	0.280	1
Perfluorononanesulfonic Acid (PFNS)	ND		ng/g	0.977	0.292	1
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND		ng/g	0.977	0.197	1
Perfluoroundecanoic Acid (PFUnA)	0.264	J	ng/g	0.977	0.046	1
Perfluorodecanesulfonic Acid (PFDS)	ND		ng/g	0.977	0.149	1
Perfluorooctanesulfonamide (FOSA)	ND		ng/g	0.977	0.096	1
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND		ng/g	0.977	0.083	1
Perfluorododecanoic Acid (PFDoA)	ND		ng/g	0.977	0.068	1
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/g	0.977	0.200	1
Perfluorotetradecanoic Acid (PFTA)	ND		ng/g	0.977	0.053	1

Project Name: BARNSTABLE AIRPORT **Lab Number:** L2043919

Project Number: 20102 **Report Date:** 10/27/20

SAMPLE RESULTS

Lab ID: L2043919-02 Date Collected: 09/25/20 12:57

Client ID: DL22(18-20) Date Received: 09/28/20

Sample Location: HYANNIS MA Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						

Surrogate (Extracted Internal Standard)	% Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	96		60-153
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	105		65-182
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	104		70-151
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	117		56-138
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	91		61-147
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	99		62-149
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	123		63-166
Perfluoro[13C8]Octanoic Acid (M8PFOA)	97		62-152
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	90		32-182
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	99		61-154
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	107		65-151
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	103		65-150
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	89		25-186
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	**0**	Q	45-137
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	115		64-158
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	25		1-125
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	**6**	Q	42-136
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	99		56-148
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	57		26-160

Project Name: BARNSTABLE AIRPORT **Lab Number:** L2043919

Project Number: 20102 **Report Date:** 10/27/20

SAMPLE RESULTS

Lab ID: L2043919-02 RE
Client ID: DL22(18-20)
Sample Location: HYANNIS MA

Date Collected: 09/25/20 12:57
Date Received: 09/28/20
Field Prep: Not Specified

Sample Depth:
Matrix: Soil
Analytical Method: 134,LCMSMS-ID
Analytical Date: 10/27/20 15:14
Analyst: RS
Percent Solids: 98%

Extraction Method: ALPHA 23528
Extraction Date: 10/27/20 10:00

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						
Perfluorobutanoic Acid (PFBA)	ND		ng/g	3.60	0.082	1
Perfluoropentanoic Acid (PFPeA)	ND		ng/g	3.60	0.166	1
Perfluorobutanesulfonic Acid (PFBS)	ND		ng/g	3.60	0.140	1
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	ND		ng/g	3.60	0.232	1
Perfluorohexanoic Acid (PFHxA)	ND		ng/g	3.60	0.189	1
Perfluoropentanesulfonic Acid (PFPeS)	ND		ng/g	3.60	0.301	1
Perfluoroheptanoic Acid (PFHpA)	ND		ng/g	3.60	0.162	1
Perfluorohexanesulfonic Acid (PFHxS)	ND		ng/g	3.60	0.218	1
Perfluorooctanoic Acid (PFOA)	0.186	J	ng/g	3.60	0.151	1
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	2.86	J	ng/g	3.60	0.647	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		ng/g	3.60	0.492	1
Perfluorononanoic Acid (PFNA)	0.490	J	ng/g	3.60	0.270	1
Perfluorooctanesulfonic Acid (PFOS)	1.23	J	ng/g	3.60	0.469	1
Perfluorodecanoic Acid (PFDA)	ND		ng/g	3.60	0.242	1
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	6.10		ng/g	3.60	1.03	1
Perfluorononanesulfonic Acid (PFNS)	ND		ng/g	3.60	1.08	1
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND		ng/g	3.60	0.726	1
Perfluoroundecanoic Acid (PFUnA)	0.292	JF	ng/g	3.60	0.169	1
Perfluorodecanesulfonic Acid (PFDS)	ND		ng/g	3.60	0.552	1
Perfluorooctanesulfonamide (FOSA)	ND		ng/g	3.60	0.353	1
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND		ng/g	3.60	0.304	1
Perfluorododecanoic Acid (PFDoA)	ND		ng/g	3.60	0.252	1
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/g	3.60	0.737	1
Perfluorotetradecanoic Acid (PFTA)	ND		ng/g	3.60	0.195	1

Project Name: BARNSTABLE AIRPORT **Lab Number:** L2043919

Project Number: 20102 **Report Date:** 10/27/20

SAMPLE RESULTS

Lab ID: L2043919-02 RE Date Collected: 09/25/20 12:57
Client ID: DL22(18-20) Date Received: 09/28/20
Sample Location: HYANNIS MA Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						

Surrogate (Extracted Internal Standard)	% Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	103		60-153
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	114		65-182
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	94		70-151
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	78		56-138
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	84		61-147
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	95		62-149
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	88		63-166
Perfluoro[13C8]Octanoic Acid (M8PFOA)	102		62-152
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	72		32-182
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	117		61-154
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	112		65-151
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	99		65-150
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	107		25-186
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	**21**	Q	45-137
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	132		64-158
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	14		1-125
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	**34**	Q	42-136
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	126		56-148
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	114		26-160

Project Name: BARNSTABLE AIRPORT **Lab Number:** L2043919

Project Number: 20102 **Report Date:** 10/27/20

Method Blank Analysis
Batch Quality Control

Analytical Method: 134,LCMSMS-ID
Analytical Date: 10/08/20 13:29
Analyst: SG

Extraction Method: ALPHA 23528
Extraction Date: 10/05/20 12:45

Parameter	Result	Qualifier	Units	RL	MDL
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab for sample(s): 01-02 Batch: WG1418146-1					
Perfluorobutanoic Acid (PFBA)	ND		ng/g	1.00	0.023
Perfluoropentanoic Acid (PFPeA)	ND		ng/g	1.00	0.046
Perfluorobutanesulfonic Acid (PFBS)	ND		ng/g	1.00	0.039
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	ND		ng/g	1.00	0.065
Perfluorohexanoic Acid (PFHxA)	ND		ng/g	1.00	0.053
Perfluoropentanesulfonic Acid (PFPeS)	ND		ng/g	1.00	0.084
Perfluoroheptanoic Acid (PFHpA)	ND		ng/g	1.00	0.045
Perfluorohexanesulfonic Acid (PFHxS)	ND		ng/g	1.00	0.061
Perfluorooctanoic Acid (PFOA)	ND		ng/g	1.00	0.042
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND		ng/g	1.00	0.180
Perfluoroheptanesulfonic Acid (PFHpS)	ND		ng/g	1.00	0.136
Perfluorononanoic Acid (PFNA)	ND		ng/g	1.00	0.075
Perfluorooctanesulfonic Acid (PFOS)	ND		ng/g	1.00	0.130
Perfluorodecanoic Acid (PFDA)	ND		ng/g	1.00	0.067
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND		ng/g	1.00	0.287
Perfluorononanesulfonic Acid (PFNS)	ND		ng/g	1.00	0.299
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND		ng/g	1.00	0.202
Perfluoroundecanoic Acid (PFUnA)	ND		ng/g	1.00	0.047
Perfluorodecanesulfonic Acid (PFDS)	ND		ng/g	1.00	0.153
Perfluorooctanesulfonamide (FOSA)	ND		ng/g	1.00	0.098
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND		ng/g	1.00	0.085
Perfluorododecanoic Acid (PFDoA)	ND		ng/g	1.00	0.070
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/g	1.00	0.204
Perfluorotetradecanoic Acid (PFTA)	ND		ng/g	1.00	0.054

Project Name: BARNSTABLE AIRPORT **Lab Number:** L2043919

Project Number: 20102 **Report Date:** 10/27/20

Method Blank Analysis
Batch Quality Control

Analytical Method: 134,LCMSMS-ID
Analytical Date: 10/08/20 13:29
Analyst: SG

Extraction Method: ALPHA 23528
Extraction Date: 10/05/20 12:45

Parameter	Result	Qualifier	Units	RL	MDL
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab for sample(s): 01-02 Batch: WG1418146-1					

Surrogate (Extracted Internal Standard)	%Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	106		60-153
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	119		65-182
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	112		70-151
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	121		56-138
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	102		61-147
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	107		62-149
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	116		63-166
Perfluoro[13C8]Octanoic Acid (M8PFOA)	107		62-152
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	99		32-182
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	111		61-154
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	114		65-151
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	108		65-150
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	115		25-186
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	86		45-137
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	125		64-158
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	1		1-125
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	95		42-136
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	122		56-148
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	104		26-160

Project Name: BARNSTABLE AIRPORT **Lab Number:** L2043919

Project Number: 20102 **Report Date:** 10/27/20

Method Blank Analysis
Batch Quality Control

Analytical Method: 134,LCMSMS-ID
Analytical Date: 10/27/20 16:08
Analyst: RS

Extraction Method: ALPHA 23528
Extraction Date: 10/27/20 10:00

Parameter	Result	Qualifier	Units	RL	MDL
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab for sample(s): 02 Batch: WG1426973-1 R					
Perfluorobutanoic Acid (PFBA)	ND		ng/g	1.00	0.023
Perfluoropentanoic Acid (PFPeA)	ND		ng/g	1.00	0.046
Perfluorobutanesulfonic Acid (PFBS)	ND		ng/g	1.00	0.039
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	ND		ng/g	1.00	0.065
Perfluorohexanoic Acid (PFHxA)	ND		ng/g	1.00	0.053
Perfluoropentanesulfonic Acid (PFPeS)	ND		ng/g	1.00	0.084
Perfluoroheptanoic Acid (PFHpA)	ND		ng/g	1.00	0.045
Perfluorohexanesulfonic Acid (PFHxS)	ND		ng/g	1.00	0.061
Perfluorooctanoic Acid (PFOA)	ND		ng/g	1.00	0.042
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND		ng/g	1.00	0.180
Perfluoroheptanesulfonic Acid (PFHpS)	ND		ng/g	1.00	0.136
Perfluorononanoic Acid (PFNA)	ND		ng/g	1.00	0.075
Perfluorooctanesulfonic Acid (PFOS)	ND		ng/g	1.00	0.130
Perfluorodecanoic Acid (PFDA)	ND		ng/g	1.00	0.067
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND		ng/g	1.00	0.287
Perfluorononanesulfonic Acid (PFNS)	ND		ng/g	1.00	0.299
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND		ng/g	1.00	0.202
Perfluoroundecanoic Acid (PFUnA)	ND		ng/g	1.00	0.047
Perfluorodecanesulfonic Acid (PFDS)	ND		ng/g	1.00	0.153
Perfluorooctanesulfonamide (FOSA)	ND		ng/g	1.00	0.098
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND		ng/g	1.00	0.085
Perfluorododecanoic Acid (PFDoA)	ND		ng/g	1.00	0.070
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/g	1.00	0.204
Perfluorotetradecanoic Acid (PFTA)	ND		ng/g	1.00	0.054

Project Name: BARNSTABLE AIRPORT **Lab Number:** L2043919

Project Number: 20102 **Report Date:** 10/27/20

Method Blank Analysis
Batch Quality Control

Analytical Method: 134,LCMSMS-ID
Analytical Date: 10/27/20 16:08
Analyst: RS

Extraction Method: ALPHA 23528
Extraction Date: 10/27/20 10:00

Parameter	Result	Qualifier	Units	RL	MDL
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab for sample(s): 02 Batch: WG1426973-1 R					

Surrogate (Extracted Internal Standard)	%Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	112		60-153
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	124		65-182
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	99		70-151
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	78		56-138
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	92		61-147
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	105		62-149
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	104		63-166
Perfluoro[13C8]Octanoic Acid (M8PFOA)	112		62-152
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	71		32-182
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	123		61-154
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	116		65-151
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	109		65-150
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	116		25-186
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	100		45-137
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	140		64-158
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	39		1-125
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	102		42-136
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	133		56-148
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	124		26-160

Lab Control Sample Analysis

Batch Quality Control

Project Name: BARNSTABLE AIRPORT

Project Number: 20102

Lab Number: L2043919

Report Date: 10/27/20

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01-02 Batch: WG1418146-2 WG1418146-3								
Perfluorobutanoic Acid (PFBA)	100		100		71-135	0		30
Perfluoropentanoic Acid (PFPeA)	100		102		69-132	2		30
Perfluorobutanesulfonic Acid (PFBS)	100		100		72-128	0		30
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	114		115		62-145	1		30
Perfluorohexanoic Acid (PFHxA)	104		105		70-132	1		30
Perfluoropentanesulfonic Acid (PFPeS)	93		97		73-123	4		30
Perfluoroheptanoic Acid (PFHpA)	101		100		71-131	1		30
Perfluorohexanesulfonic Acid (PFHxS)	80		85		67-130	6		30
Perfluorooctanoic Acid (PFOA)	102		103		69-133	1		30
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	107		104		64-140	3		30
Perfluoroheptanesulfonic Acid (PFHpS)	96		96		70-132	0		30
Perfluorononanoic Acid (PFNA)	100		101		72-129	1		30
Perfluorooctanesulfonic Acid (PFOS)	100		100		68-136	0		30
Perfluorodecanoic Acid (PFDA)	109		102		69-133	7		30
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	108		109		65-137	1		30
Perfluorononanesulfonic Acid (PFNS)	107		101		69-125	6		30
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	119		130		63-144	9		30
Perfluoroundecanoic Acid (PFUnA)	97		99		64-136	2		30
Perfluorodecanesulfonic Acid (PFDS)	106		103		59-134	3		30
Perfluorooctanesulfonamide (FOSA)	106		80		67-137	28		30
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	114		108		61-139	5		30
Perfluorododecanoic Acid (PFDoA)	89		90		69-135	1		30

Lab Control Sample Analysis

Batch Quality Control

Project Name: BARNSTABLE AIRPORT

Project Number: 20102

Lab Number: L2043919

Report Date: 10/27/20

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01-02 Batch: WG1418146-2 WG1418146-3								
Perfluorotridecanoic Acid (PFTrDA)	104		109		66-139	5		30
Perfluorotetradecanoic Acid (PFTA)	102		99		69-133	3		30

Surrogate (Extracted Internal Standard)	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	109		106		60-153
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	120		117		65-182
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	108		106		70-151
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	116		114		56-138
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	102		98		61-147
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	109		104		62-149
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	114		107		63-166
Perfluoro[13C8]Octanoic Acid (M8PFOA)	109		106		62-152
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	99		101		32-182
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	112		108		61-154
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	111		112		65-151
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	107		108		65-150
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	98		108		25-186
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	82		79		45-137
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	125		125		64-158
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	26		3		1-125
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	91		98		42-136
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	115		112		56-148
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	104		104		26-160

Lab Control Sample Analysis
Batch Quality Control

Project Name: BARNSTABLE AIRPORT
Project Number: 20102
Lab Number: L2043919
Report Date: 10/27/20

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 02 Batch: WG1426973-2 WG1426973-3								
Perfluorobutanoic Acid (PFBA)	95		95		71-135	0		30
Perfluoropentanoic Acid (PFPeA)	96		95		69-132	1		30
Perfluorobutanesulfonic Acid (PFBS)	93		94		72-128	1		30
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	106		103		62-145	3		30
Perfluorohexanoic Acid (PFHxA)	96		96		70-132	0		30
Perfluoropentanesulfonic Acid (PFPeS)	80		88		73-123	10		30
Perfluoroheptanoic Acid (PFHpA)	94		93		71-131	1		30
Perfluorohexanesulfonic Acid (PFHxS)	74		81		67-130	9		30
Perfluorooctanoic Acid (PFOA)	95		97		69-133	2		30
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	98		97		64-140	1		30
Perfluoroheptanesulfonic Acid (PFHpS)	88		84		70-132	5		30
Perfluorononanoic Acid (PFNA)	95		94		72-129	1		30
Perfluorooctanesulfonic Acid (PFOS)	94		95		68-136	1		30
Perfluorodecanoic Acid (PFDA)	97		97		69-133	0		30
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	119		109		65-137	9		30
Perfluorononanesulfonic Acid (PFNS)	107		102		69-125	5		30
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	96		105		63-144	9		30
Perfluoroundecanoic Acid (PFUnA)	92		93		64-136	1		30
Perfluorodecanesulfonic Acid (PFDS)	106		102		59-134	4		30
Perfluorooctanesulfonamide (FOSA)	90		88		67-137	2		30
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	108		108		61-139	0		30
Perfluorododecanoic Acid (PFDoA)	91		86		69-135	6		30

Lab Control Sample Analysis

Batch Quality Control

Project Name: BARNSTABLE AIRPORT

Project Number: 20102

Lab Number: L2043919

Report Date: 10/27/20

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 02 Batch: WG1426973-2 WG1426973-3								
Perfluorotridecanoic Acid (PFTrDA)	102		98		66-139	4		30
Perfluorotetradecanoic Acid (PFTA)	97		94		69-133	3		30

Surrogate (Extracted Internal Standard)	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	110		116		60-153
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	121		129		65-182
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	95		102		70-151
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	84		88		56-138
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	88		94		61-147
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	99		107		62-149
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	109		105		63-166
Perfluoro[13C8]Octanoic Acid (M8PFOA)	109		113		62-152
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	77		78		32-182
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	121		125		61-154
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	113		121		65-151
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	105		112		65-150
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	108		110		25-186
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	91		84		45-137
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	131		134		64-158
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	21		53		1-125
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	96		97		42-136
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	125		131		56-148
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	109		117		26-160

INORGANICS
&
MISCELLANEOUS

Project Name: BARNSTABLE AIRPORT
Project Number: 20102
Lab Number: L2043919
Report Date: 10/27/20

SAMPLE RESULTS

Lab ID: L2043919-01
Client ID: DL22(6-8)
Sample Location: HYANNIS MA
Sample Depth:
Matrix: Soil

Date Collected: 09/25/20 12:51
Date Received: 09/28/20
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Mansfield Lab										
Solids, Total	96.6		%	0.100	0.100	1	-	09/30/20 10:18	121,2540G	JW

Project Name: BARNSTABLE AIRPORT
Project Number: 20102
Lab Number: L2043919
Report Date: 10/27/20

SAMPLE RESULTS

Lab ID: L2043919-02
Client ID: DL22(18-20)
Sample Location: HYANNIS MA
Sample Depth:
Matrix: Soil

Date Collected: 09/25/20 12:57
Date Received: 09/28/20
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Mansfield Lab										
Solids, Total	98.2		%	0.100	0.100	1	-	09/30/20 10:18	121,2540G	JW

Project Name: BARNSTABLE AIRPORT
Project Number: 20102
Lab Number: L2043919
Report Date: 10/27/20

PFAS PARAMETER SUMMARY

Parameter	Acronym	CAS Number
PERFLUOROALKYL CARBOXYLIC ACIDS (PFCAs)		
Perfluorooctadecanoic Acid	PFODA	16517-11-6
Perfluorohexadecanoic Acid	PFHxDA	67905-19-5
Perfluorotetradecanoic Acid	PFTA	376-06-7
Perfluorotridecanoic Acid	PFTrDA	72629-94-8
Perfluorododecanoic Acid	PFDoA	307-55-1
Perfluoroundecanoic Acid	PFUnA	2058-94-8
Perfluorodecanoic Acid	PFDA	335-76-2
Perfluorononanoic Acid	PFNA	375-95-1
Perfluorooctanoic Acid	PFOA	335-67-1
Perfluoroheptanoic Acid	PFHpA	375-85-9
Perfluorohexanoic Acid	PFHxA	307-24-4
Perfluoropentanoic Acid	PFPeA	2706-90-3
Perfluorobutanoic Acid	PFBA	375-22-4
PERFLUOROALKYL SULFONIC ACIDS (PFSAs)		
Perfluorododecanesulfonic Acid	PFDoDS	79780-39-5
Perfluorodecanesulfonic Acid	PFDS	335-77-3
Perfluorononanesulfonic Acid	PFNS	68259-12-1
Perfluorooctanesulfonic Acid	PFOS	1763-23-1
Perfluoroheptanesulfonic Acid	PFHpS	375-92-8
Perfluorohexanesulfonic Acid	PFHxS	355-46-4
Perfluoropentanesulfonic Acid	PFPeS	2706-91-4
Perfluorobutanesulfonic Acid	PFBS	375-73-5
FLUOROTELOMERS		
1H,1H,2H,2H-Perfluorododecanesulfonic Acid	10:2FTS	120226-60-0
1H,1H,2H,2H-Perfluorodecanesulfonic Acid	8:2FTS	39108-34-4
1H,1H,2H,2H-Perfluorooctanesulfonic Acid	6:2FTS	27619-97-2
1H,1H,2H,2H-Perfluorohexanesulfonic Acid	4:2FTS	757124-72-4
PERFLUOROALKANE SULFONAMIDES (FASAs)		
Perfluorooctanesulfonamide	FOSA	754-91-6
N-Ethyl Perfluorooctane Sulfonamide	NEtFOSA	4151-50-2
N-Methyl Perfluorooctane Sulfonamide	NMeFOSA	31506-32-8
PERFLUOROALKANE SULFONYL SUBSTANCES		
N-Ethyl Perfluorooctanesulfonamido Ethanol	NEtFOSE	1691-99-2
N-Methyl Perfluorooctanesulfonamido Ethanol	NMeFOSE	24448-09-7
N-Ethyl Perfluorooctanesulfonamidoacetic Acid	NEtFOSAA	2991-50-6
N-Methyl Perfluorooctanesulfonamidoacetic Acid	NMeFOSAA	2355-31-9
PER- and POLYFLUOROALKYL ETHER CARBOXYLIC ACIDS		
2,3,3,3-Tetrafluoro-2-[1,1,2,2,3,3,3-Heptafluoropropoxy]-Propanoic Acid	HFPO-DA	13252-13-6
4,8-Dioxa-3h-Perfluorononanoic Acid	ADONA	919005-14-4
CHLORO-PERFLUOROALKYL SULFONIC ACIDS		
11-Chloroeicosafluoro-3-Oxaundecane-1-Sulfonic Acid	11Cl-PF3OUdS	763051-92-9
9-Chlorohexadecafluoro-3-Oxanone-1-Sulfonic Acid	9Cl-PF3ONS	756426-58-1
PERFLUOROETHER SULFONIC ACIDS (PFESAs)		
Perfluoro(2-Ethoxyethane)Sulfonic Acid	PFEESA	113507-82-7
PERFLUOROETHER/POLYETHER CARBOXYLIC ACIDS (PFPCAs)		
Perfluoro-3-Methoxypropanoic Acid	PFMPA	377-73-1
Perfluoro-4-Methoxybutanoic Acid	PFMBA	863090-89-5
Nonafluoro-3,6-Dioxaheptanoic Acid	NFDHA	151772-58-6

Project Name:	BARNSTABLE AIRPORT	**Lab Number:**	L2043919
Project Number:	20102	**Report Date:**	10/27/20

GLOSSARY

Acronyms

DL - Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the limit of quantitation (LOQ). The DL includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

EDL - Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).

EMPC - Estimated Maximum Possible Concentration: The concentration that results from the signal present at the retention time of an analyte when the ions meet all of the identification criteria except the ion abundance ratio criteria. An EMPC is a worst-case estimate of the concentration.

EPA - Environmental Protection Agency.

LCS - Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

LCSD - Laboratory Control Sample Duplicate: Refer to LCS.

LFB - Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

LOD - Limit of Detection: This value represents the level to which a target analyte can reliably be detected for a specific analyte in a specific matrix by a specific method. The LOD includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

LOQ - Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

MDL - Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

MS - Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available. For Method 332.0, the spike recovery is calculated using the native concentration, including estimated values.

MSD - Matrix Spike Sample Duplicate: Refer to MS.

NA - Not Applicable.

NC - Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.

NDPA/DPA - N-Nitrosodiphenylamine/Diphenylamine.

NI - Not Ignitable.

NP - Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.

NR - No Results: Term is utilized when 'No Target Compounds Requested' is reported for the analysis of Volatile or Semivolatile Organic TIC only requests.

RL - Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

RPD - Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.

SRM - Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.

STLP - Semi-dynamic Tank Leaching Procedure per EPA Method 1315.

TEF - Toxic Equivalency Factors: The values assigned to each dioxin and furan to evaluate their toxicity relative to 2,3,7,8-TCDD.

TEQ - Toxic Equivalent: The measure of a sample's toxicity derived by multiplying each dioxin and furan by its corresponding TEF and then summing the resulting values.

TIC - Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

Report Format: DU Report with 'J' Qualifiers

Project Name:	BARNSTABLE AIRPORT	**Lab Number:**	L2043919
Project Number:	20102	**Report Date:**	10/27/20

Footnotes

1 - The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

Terms

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

Difference: With respect to Total Oxidizable Precursor (TOP) Assay analysis, the difference is defined as the Post-Treatment value minus the Pre-Treatment value.

Final pH: As it pertains to Sample Receipt & Container Information section of the report, Final pH reflects pH of container determined after adjustment at the laboratory, if applicable. If no adjustment required, value reflects Initial pH.

Frozen Date/Time: With respect to Volatile Organics in soil, Frozen Date/Time reflects the date/time at which associated Reagent Water-preserved vials were initially frozen. Note: If frozen date/time is beyond 48 hours from sample collection, value will be reflected in 'bold'.

Initial pH: As it pertains to Sample Receipt & Container Information section of the report, Initial pH reflects pH of container determined upon receipt, if applicable.

PAH Total: With respect to Alkylated PAH analyses, the 'PAHs, Total' result is defined as the summation of results for all or a subset of the following compounds: Naphthalene, C1-C4 Naphthalenes, 2-Methylnaphthalene, 1-Methylnaphthalene, Biphenyl, Acenaphthylene, Acenaphthene, Fluorene, C1-C3 Fluorenes, Phenanthrene, C1-C4 Phenanthrenes/Anthracenes, Anthracene, Fluoranthene, Pyrene, C1-C4 Fluoranthenes/Pyrenes, Benz(a)anthracene, Chrysene, C1-C4 Chrysenes, Benzo(b)fluoranthene, Benzo(j)+(k)fluoranthene, Benzo(e)pyrene, Benzo(a)pyrene, Perylene, Indeno(1,2,3-cd)pyrene, Dibenz(ah)+(ac)anthracene, Benzo(g,h,i)perylene. If a 'Total' result is requested, the results of its individual components will also be reported.

PFAS Total: With respect to PFAS analyses, the 'PFAS, Total (5)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA and PFOS. If a 'Total' result is requested, the results of its individual components will also be reported.

The target compound Chlordane (CAS No. 57-74-9) is reported for GC ECD analyses. Per EPA,this compound "refers to a mixture of chlordane isomers, other chlorinated hydrocarbons and numerous other components." (Reference: USEPA Toxicological Review of Chlordane, In Support of Summary Information on the Integrated Risk Information System (IRIS), December 1997.)

Total: With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

Data Qualifiers

A - Spectra identified as "Aldol Condensates" are byproducts of the extraction/concentration procedures when acetone is introduced in the process.

B - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).

C - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.

D - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.

E - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

F - The ratio of quantifier ion response to qualifier ion response falls outside of the laboratory criteria. Results are considered to be an estimated maximum concentration.

G - The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.

H - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.

I - The lower value for the two columns has been reported due to obvious interference.

J - Estimated value. The Target analyte concentration is below the quantitation limit (RL), but above the Method Detection Limit (MDL) or Estimated Detection Limit (EDL) for SPME-related analyses. This represents an estimated concentration for Tentatively Identified Compounds (TICs).

M - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.

ND - Not detected at the method detection limit (MDL) for the sample, or estimated detection limit (EDL) for SPME-related analyses.

NJ - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where

Report Format: DU Report with 'J' Qualifiers

Project Name:	BARNSTABLE AIRPORT	**Lab Number:**	L2043919
Project Number:	20102	**Report Date:**	10/27/20

Data Qualifiers

the identification is based on a mass spectral library search.

P - The RPD between the results for the two columns exceeds the method-specified criteria.

Q - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)

R - Analytical results are from sample re-analysis.

RE - Analytical results are from sample re-extraction.

S - Analytical results are from modified screening analysis.

Project Name: BARNSTABLE AIRPORT **Lab Number:** L2043919

Project Number: 20102 **Report Date:** 10/27/20

REFERENCES

121 Standard Methods for the Examination of Water and Wastewater. APHA-AWWA-WEF. Standard Methods Online.

134 Determination of Selected Perfluorinated Alkyl Acids in Drinking Water by Solid Phase Extraction and Liquid Chromatography/Tandem Mass Spectrometry (LC/MS/MS) using Isotope Dilution. Alpha SOP 23528.

LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.

Certification Information

The following analytes are not included in our Primary NELAP Scope of Accreditation:

Westborough Facility
EPA 624/624.1: m/p-xylene, o-xylene, Naphthalene
EPA 8260C: NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene; SCM: Iodomethane (methyl iodide), 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.
EPA 8270D: NPW: Dimethylnaphthalene,1,4-Diphenylhydrazine; SCM: Dimethylnaphthalene,1,4-Diphenylhydrazine.
SM4500: NPW: Amenable Cyanide; SCM: Total Phosphorus, TKN, NO2, NO3.

Mansfield Facility
SM 2540D: TSS
EPA 8082A: NPW: PCB: 1, 5, 31, 87,101, 110, 141, 151, 153, 180, 183, 187.
EPA TO-15: Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.
EPA TO-12 Non-methane organics
EPA 3C Fixed gases
Biological Tissue Matrix: EPA 3050B

The following analytes are included in our Massachusetts DEP Scope of Accreditation

Westborough Facility:

Drinking Water
EPA 300.0: Chloride, Nitrate-N, Fluoride, Sulfate; **EPA 353.2**: Nitrate-N, Nitrite-N; **SM4500NO3-F**: Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500Cl-D, SM2320B, SM2540C, SM4500H-B, SM4500NO2-B**
EPA 332: Perchlorate; **EPA 524.2:** THMs and VOCs; **EPA 504.1:** EDB, DBCP.
Microbiology: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT,SM9222D**.

Non-Potable Water
SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2320B, SM4500CL-E, SM4500F-BC, SM4500NH3-BH: Ammonia-N and Kjeldahl-N, **EPA 350.1**: Ammonia-N, **LACHAT 10-107-06-1-B**: Ammonia-N, **EPA 351.1, SM4500NO3-F, EPA 353.2**: Nitrate-N**, SM4500P-E, SM4500P-B, E, SM4500SO4-E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, EPA 420.1, SM4500-CN-CE, SM2540D, EPA 300: Chloride, Sulfate, Nitrate.**
EPA 624.1: Volatile Halocarbons & Aromatics,
EPA 608.3: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs
EPA 625.1: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045**: PCB-Oil.
Microbiology: **SM9223B-Colilert-QT; Enterolert-QT, SM9221E, EPA 1600, EPA 1603.**

Mansfield Facility:

Drinking Water
EPA 200.7: Al, Ba, Cd, Cr, Cu, Fe, Mn, Ni, Na, Ag, Ca, Zn. **EPA 200.8:** Al, Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Mn, Ni, Se, Ag, TL, Zn. **EPA 245.1** Hg.
EPA 522.

Non-Potable Water
EPA 200.7: Al, Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Sr, TL, Ti, V, Zn.
EPA 200.8: Al, Sb**,** As, Be, Cd, Cr, Cu, Fe, Pb, Mn, Ni, K, Se, Ag, Na, TL, Zn.
EPA 245.1 Hg.
SM2340B

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

L2043919-kb 10/13/20

CHAIN OF CUSTODY

PAGE 1 OF 1

Date Rec'd in Lab: 9/28/20

ALPHA Job #: L2043919

ALPHA ANALYTICAL LABS
WESTBORO, MA TEL: 508-898-9220 FAX: 508-898-9193
MANSFIELD, MA TEL: 508-822-9300 FAX: 508-822-3288

Client Information

Client: Horsley Witten Group
Address: 90 Route 6A
Sandwich MA 02563
Phone: (508)
Fax:
Email: bmassa@horsleywitten.com
☐ These samples have been previously analyzed by Alpha

Project Information

Project Name: Barnstable Airport
Project Location: Hyannis MA
Project #: 20102
Project Manager: Bryan Massa
ALPHA Quote #:

Turn-Around Time

☑ Standard ☐ RUSH (only confirmed if pre-approved)
Date Due: Time:

Report Information - Data Deliverables

☐ FAX ☐ EMAIL
☐ ADEx ☐ Add'l Deliverables

Billing Information

☐ Same as Client info PO #:

Regulatory Requirements/Report Limits

State /Fed Program | Criteria

Other Project Specific Requirements/Comments/Detection Limits:

ANALYSIS: PFAS Isotope Dilution

SAMPLE HANDLING
Filtration
☐ Done
☐ Not needed
☐ Lab to do
Preservation
☐ Lab to do
(Please specify below)

TOTAL # BOTTLES

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler's Initials			Sample Specific Comments
43919-01	DL22 (2-4)	9/25/20	12:45	Soil	SB	✓		
43919-02	DL22 (6-8)	9/25/20	12:51	Soil	SB	x	✓	
43919-03	DL22 (18-20)	9/25/20	12:57	Soil	SB	x	✓	
43919-04	DL19 (0-1)	9/25/20	13:27	Soil	SB	✓	✓ (SB)	
43919-05	DL20 (0-1)	9/25/20	13:34	Soil	SB	✓		
43919-06	DL21 (0-1)	9/25/20	13:40	Soil	SB	✓		
43919-07	DL18 (0-1)	9/25/20	15:10	Soil	SB	✓		
43919-08	DL17 (0-1)	9/25/20	15:15	Soil	SB	✓		

Container Type	
Preservative	

Relinquished By:	Date/Time	Received By:	Date/Time
Brian Massa TGA AA	9/28/20 13:30	TGA AA	9/28/20 1740
	9/28/20 2050		9/28/20 2050

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. All samples submitted are subject to Alpha's Terms and Conditions. See reverse side.

FORM NO: 01-01 (rev. 14-OCT-07)

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

October 26, 2020

Bryan Massa
Horsley Witten Group
90 Route 6A Unit #1
Sandwich, MA 02563

Project Location: Hyannis, MA
Client Job Number:
Project Number: 19128
Laboratory Work Order Number: 20J0175

Enclosed are results of analyses for samples received by the laboratory on October 5, 2020. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Raymond J. McCarthy
Project Manager

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Horsley Witten Group
90 Route 6A Unit #1
Sandwich, MA 02563
ATTN: Bryan Massa

REPORT DATE: 10/26/2020

PURCHASE ORDER NUMBER:

PROJECT NUMBER: 19128

ANALYTICAL SUMMARY

WORK ORDER NUMBER: 20J0175

The results of analyses performed on the following samples submitted to the CON-TEST Analytical Laboratory are found in this report.

PROJECT LOCATION: Hyannis, MA

FIELD SAMPLE #	LAB ID:	MATRIX	SAMPLE DESCRIPTION	TEST	SUB LAB
HW-P(s)	20J0175-01	Water		SOP 434-PFAAS	
HW-P(m)	20J0175-02	Water		SOP 434-PFAAS	
HW-Q(S)	20J0175-03	Water		SOP 434-PFAAS	
HW-Q(m)	20J0175-04	Water		SOP 434-PFAAS	
HW-R	20J0175-05	Water		SOP 434-PFAAS	
HW-T(m)	20J0175-06	Water		SOP 434-PFAAS	
HW-T(s)	20J0175-07	Water		SOP 434-PFAAS	
HW-S(s)	20J0175-08	Water		SOP 434-PFAAS	
HW-S(m)	20J0175-09	Water		SOP 434-PFAAS	
HW-U(d)	20J0175-10	Water		SOP 434-PFAAS	
				SW-846 8270D-E	
HW-V(m)	20J0175-11	Water		SOP 434-PFAAS	
				SW-846 8270D-E	
OW-9(dd)	20J0175-12	Water		SOP 434-PFAAS	

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

CASE NARRATIVE SUMMARY

All reported results are within defined laboratory quality control objectives unless listed below or otherwise qualified in this report.

SOP 434-PFAAS

Qualifications:

PF-01A

Surrogate recovery is outside of control limits. Sample not re-extracted past holding time.

Analyte & Samples(s) Qualified:

13C-PFDA
20J0175-05[HW-R]

d5-NEtFOSAA
20J0175-01[HW-P(s)], 20J0175-03[HW-Q(S)], 20J0175-04[HW-Q(m)], 20J0175-05[HW-R], 20J0175-08[HW-S(s)], 20J0175-11[HW-V(m)], 20J0175-12[OW-9(dd)]

S-01

The surrogate recovery for this sample is not available due to sample dilution below the surrogate reporting limit required from high analyte concentration and/or matrix interferences.

Analyte & Samples(s) Qualified:

13C-PFDA
20J0175-01RE1[HW-P(s)], 20J0175-06RE1[HW-T(m)], 20J0175-07RE1[HW-T(s)], 20J0175-08RE1[HW-S(s)]

13C-PFHxA
20J0175-01RE1[HW-P(s)], 20J0175-06RE1[HW-T(m)], 20J0175-07RE1[HW-T(s)], 20J0175-08RE1[HW-S(s)]

d5-NEtFOSAA
20J0175-01RE1[HW-P(s)], 20J0175-06RE1[HW-T(m)], 20J0175-07RE1[HW-T(s)], 20J0175-08RE1[HW-S(s)]

The results of analyses reported only relate to samples submitted to the Con-Test Analytical Laboratory for testing.
I certify that the analyses listed above, unless specifically listed as subcontracted, if any, were performed under my direction according to the approved methodologies listed in this document, and that based upon my inquiry of those individuals immediately responsible for obtaining the information, the material contained in this report is, to the best of my knowledge and belief, accurate and complete.

Lisa A. Worthington
Technical Representative

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Hyannis, MA | Sample Description: | Work Order: 20J0175

Date Received: 10/5/2020

Field Sample #: HW-P(s) | Sampled: 10/1/2020 11:33

Sample ID: 20J0175-01

Sample Matrix: Water

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	41	2.0	0.64	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 17:59	JFC
Perfluorobutanesulfonic acid (PFBS)	0.58	2.0	0.50	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 17:59	JFC
Perfluoropentanoic acid (PFPeA)	100	20	4.2	ng/L	10		SOP 434-PFAAS	10/15/20	10/22/20 19:54	JFC
Perfluorohexanoic acid (PFHxA)	45	2.0	0.51	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 17:59	JFC
Perfluorohexanesulfonic acid (PFHxS)	1.8	2.0	0.77	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 17:59	JFC
Perfluoroheptanoic acid (PFHpA)	26	2.0	0.53	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 17:59	JFC
Perfluoroheptanesulfonic acid (PFHpS)	ND	2.0	1.0	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 17:59	JFC
Perfluorooctanoic acid (PFOA)	8.4	2.0	0.71	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 17:59	JFC
Perfluorooctanesulfonic acid (PFOS)	0.97	2.0	0.68	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 17:59	JFC
Perfluorooctanesulfonamide (FOSA)	ND	2.0	0.83	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 17:59	JFC
6:2 Fluorotelomersulfonic acid (6:2FTS A)	11	2.0	0.39	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 17:59	JFC
Perfluorononanoic acid (PFNA)	6.1	2.0	0.63	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 17:59	JFC
Perfluorodecanoic acid (PFDA)	0.85	2.0	0.62	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 17:59	JFC
Perfluorodecanesulfonic acid (PFDS)	ND	2.0	0.51	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 17:59	JFC
N-EtFOSAA	ND	2.0	0.70	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 17:59	JFC
8:2 Fluorotelomersulfonic acid (8:2FTS A)	2.6	2.0	1.1	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 17:59	JFC
Perfluoroundecanoic acid (PFUnA)	1.5	2.0	0.49	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 17:59	JFC
N-MeFOSAA	ND	2.0	0.62	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 17:59	JFC
Perfluorododecanoic acid (PFDoA)	ND	2.0	0.50	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 17:59	JFC
Perfluorotridecanoic acid (PFTrDA)	ND	2.0	0.67	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 17:59	JFC
Perfluorotetradecanoic acid (PFTA)	ND	2.0	0.50	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 17:59	JFC

Surrogates	% Recovery		Recovery Limits	Flag/Qual	
13C-PFHxA	81.0		70-130		10/21/20 17:59
13C-PFHxA		*	70-130	S-01, U	10/22/20 19:54
13C-PFDA	74.0		70-130		10/21/20 17:59
13C-PFDA		*	70-130	S-01, U	10/22/20 19:54
d5-NEtFOSAA	**69.2**	*	70-130	PF-01A	10/21/20 17:59
d5-NEtFOSAA		*	70-130	S-01, U	10/22/20 19:54

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Hyannis, MA | Sample Description: | Work Order: 20J0175

Date Received: 10/5/2020

Field Sample #: HW-P(m) | Sampled: 10/1/2020 11:35

Sample ID: 20J0175-02

Sample Matrix: Water

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	3.6	2.0	0.64	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 18:20	JFC
Perfluorobutanesulfonic acid (PFBS)	ND	2.0	0.50	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 18:20	JFC
Perfluoropentanoic acid (PFPeA)	11	2.0	0.42	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 18:20	JFC
Perfluorohexanoic acid (PFHxA)	6.3	2.0	0.51	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 18:20	JFC
Perfluorohexanesulfonic acid (PFHxS)	0.85	2.0	0.77	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 18:20	JFC
Perfluoroheptanoic acid (PFHpA)	3.0	2.0	0.53	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 18:20	JFC
Perfluoroheptanesulfonic acid (PFHpS)	ND	2.0	1.0	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 18:20	JFC
Perfluorooctanoic acid (PFOA)	1.8	2.0	0.71	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 18:20	JFC
Perfluorooctanesulfonic acid (PFOS)	1.1	2.0	0.68	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 18:20	JFC
Perfluorooctanesulfonamide (FOSA)	ND	2.0	0.83	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 18:20	JFC
6:2 Fluorotelomersulfonic acid (6:2FTS A)	0.92	2.0	0.39	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 18:20	JFC
Perfluorononanoic acid (PFNA)	1.1	2.0	0.63	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 18:20	JFC
Perfluorodecanoic acid (PFDA)	ND	2.0	0.62	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 18:20	JFC
Perfluorodecanesulfonic acid (PFDS)	ND	2.0	0.51	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 18:20	JFC
N-EtFOSAA	ND	2.0	0.70	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 18:20	JFC
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	2.0	1.1	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 18:20	JFC
Perfluoroundecanoic acid (PFUnA)	ND	2.0	0.49	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 18:20	JFC
N-MeFOSAA	ND	2.0	0.62	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 18:20	JFC
Perfluorododecanoic acid (PFDoA)	ND	2.0	0.50	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 18:20	JFC
Perfluorotridecanoic acid (PFTrDA)	ND	2.0	0.67	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 18:20	JFC
Perfluorotetradecanoic acid (PFTA)	ND	2.0	0.50	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 18:20	JFC

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
13C-PFHxA	78.7	70-130		10/21/20 18:20
13C-PFDA	74.5	70-130		10/21/20 18:20
d5-NEtFOSAA	71.1	70-130		10/21/20 18:20

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Hyannis, MA | Sample Description: | Work Order: 20J0175

Date Received: 10/5/2020

Field Sample #: HW-Q(S) | Sampled: 10/1/2020 13:12

Sample ID: 20J0175-03

Sample Matrix: Water

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	1.0	2.0	0.64	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 18:42	JFC
Perfluorobutanesulfonic acid (PFBS)	ND	2.0	0.50	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 18:42	JFC
Perfluoropentanoic acid (PFPeA)	3.3	2.0	0.42	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 18:42	JFC
Perfluorohexanoic acid (PFHxA)	2.6	2.0	0.51	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 18:42	JFC
Perfluorohexanesulfonic acid (PFHxS)	13	2.0	0.77	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 18:42	JFC
Perfluoroheptanoic acid (PFHpA)	1.8	2.0	0.53	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 18:42	JFC
Perfluoroheptanesulfonic acid (PFHpS)	ND	2.0	1.0	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 18:42	JFC
Perfluorooctanoic acid (PFOA)	4.9	2.0	0.71	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 18:42	JFC
Perfluorooctanesulfonic acid (PFOS)	4.1	2.0	0.68	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 18:42	JFC
Perfluorooctanesulfonamide (FOSA)	ND	2.0	0.83	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 18:42	JFC
6:2 Fluorotelomersulfonic acid (6:2FTS A)	ND	2.0	0.39	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 18:42	JFC
Perfluorononanoic acid (PFNA)	ND	2.0	0.63	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 18:42	JFC
Perfluorodecanoic acid (PFDA)	ND	2.0	0.62	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 18:42	JFC
Perfluorodecanesulfonic acid (PFDS)	ND	2.0	0.51	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 18:42	JFC
N-EtFOSAA	ND	2.0	0.70	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 18:42	JFC
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	2.0	1.1	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 18:42	JFC
Perfluoroundecanoic acid (PFUnA)	ND	2.0	0.49	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 18:42	JFC
N-MeFOSAA	ND	2.0	0.62	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 18:42	JFC
Perfluorododecanoic acid (PFDoA)	ND	2.0	0.50	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 18:42	JFC
Perfluorotridecanoic acid (PFTrDA)	ND	2.0	0.67	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 18:42	JFC
Perfluorotetradecanoic acid (PFTA)	ND	2.0	0.50	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 18:42	JFC

Surrogates	% Recovery		Recovery Limits	Flag/Qual	
13C-PFHxA	81.0		70-130		10/21/20 18:42
13C-PFDA	70.7		70-130		10/21/20 18:42
d5-NEtFOSAA	**64.6**	*	70-130	PF-01A	10/21/20 18:42

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Hyannis, MA | Sample Description: | Work Order: 20J0175

Date Received: 10/5/2020

Field Sample #: HW-Q(m) | Sampled: 10/1/2020 13:10

Sample ID: 20J0175-04

Sample Matrix: Water

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	ND	2.0	0.64	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 19:04	JFC
Perfluorobutanesulfonic acid (PFBS)	ND	2.0	0.50	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 19:04	JFC
Perfluoropentanoic acid (PFPeA)	ND	2.0	0.42	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 19:04	JFC
Perfluorohexanoic acid (PFHxA)	0.94	2.0	0.51	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 19:04	JFC
Perfluorohexanesulfonic acid (PFHxS)	1.9	2.0	0.77	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 19:04	JFC
Perfluoroheptanoic acid (PFHpA)	ND	2.0	0.53	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 19:04	JFC
Perfluoroheptanesulfonic acid (PFHpS)	ND	2.0	1.0	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 19:04	JFC
Perfluorooctanoic acid (PFOA)	0.95	2.0	0.71	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 19:04	JFC
Perfluorooctanesulfonic acid (PFOS)	4.9	2.0	0.68	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 19:04	JFC
Perfluorooctanesulfonamide (FOSA)	ND	2.0	0.83	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 19:04	JFC
6:2 Fluorotelomersulfonic acid (6:2FTS A)	ND	2.0	0.39	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 19:04	JFC
Perfluorononanoic acid (PFNA)	0.75	2.0	0.63	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 19:04	JFC
Perfluorodecanoic acid (PFDA)	ND	2.0	0.62	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 19:04	JFC
Perfluorodecanesulfonic acid (PFDS)	ND	2.0	0.51	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 19:04	JFC
N-EtFOSAA	ND	2.0	0.70	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 19:04	JFC
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	2.0	1.1	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 19:04	JFC
Perfluoroundecanoic acid (PFUnA)	ND	2.0	0.49	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 19:04	JFC
N-MeFOSAA	ND	2.0	0.62	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 19:04	JFC
Perfluorododecanoic acid (PFDoA)	ND	2.0	0.50	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 19:04	JFC
Perfluorotridecanoic acid (PFTrDA)	ND	2.0	0.67	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 19:04	JFC
Perfluorotetradecanoic acid (PFTA)	ND	2.0	0.50	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 19:04	JFC

Surrogates	% Recovery		Recovery Limits	Flag/Qual	
13C-PFHxA	79.2		70-130		10/21/20 19:04
13C-PFDA	71.2		70-130		10/21/20 19:04
d5-NEtFOSAA	**67.3**	*	70-130	PF-01A	10/21/20 19:04

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Hyannis, MA | Sample Description: | Work Order: 20J0175

Date Received: 10/5/2020

Field Sample #: HW-R | Sampled: 10/1/2020 14:00

Sample ID: 20J0175-05

Sample Matrix: Water

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	14	2.0	0.64	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 19:26	JFC
Perfluorobutanesulfonic acid (PFBS)	1.6	2.0	0.50	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 19:26	JFC
Perfluoropentanoic acid (PFPeA)	50	2.0	0.42	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 19:26	JFC
Perfluorohexanoic acid (PFHxA)	39	2.0	0.51	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 19:26	JFC
Perfluorohexanesulfonic acid (PFHxS)	20	2.0	0.77	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 19:26	JFC
Perfluoroheptanoic acid (PFHpA)	21	2.0	0.53	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 19:26	JFC
Perfluoroheptanesulfonic acid (PFHpS)	ND	2.0	1.0	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 19:26	JFC
Perfluorooctanoic acid (PFOA)	14	2.0	0.71	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 19:26	JFC
Perfluorooctanesulfonic acid (PFOS)	16	2.0	0.68	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 19:26	JFC
Perfluorooctanesulfonamide (FOSA)	ND	2.0	0.83	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 19:26	JFC
6:2 Fluorotelomersulfonic acid (6:2FTS A)	37	2.0	0.39	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 19:26	JFC
Perfluorononanoic acid (PFNA)	3.1	2.0	0.63	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 19:26	JFC
Perfluorodecanoic acid (PFDA)	ND	2.0	0.62	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 19:26	JFC
Perfluorodecanesulfonic acid (PFDS)	ND	2.0	0.51	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 19:26	JFC
N-EtFOSAA	ND	2.0	0.70	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 19:26	JFC
8:2 Fluorotelomersulfonic acid (8:2FTS A)	1.4	2.0	1.1	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 19:26	JFC
Perfluoroundecanoic acid (PFUnA)	ND	2.0	0.49	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 19:26	JFC
N-MeFOSAA	ND	2.0	0.62	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 19:26	JFC
Perfluorododecanoic acid (PFDoA)	ND	2.0	0.50	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 19:26	JFC
Perfluorotridecanoic acid (PFTrDA)	ND	2.0	0.67	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 19:26	JFC
Perfluorotetradecanoic acid (PFTA)	ND	2.0	0.50	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 19:26	JFC

Surrogates	% Recovery		Recovery Limits	Flag/Qual	
13C-PFHxA	81.1		70-130		10/21/20 19:26
13C-PFDA	**63.5**	*	70-130	PF-01A	10/21/20 19:26
d5-NEtFOSAA	**63.9**	*	70-130	PF-01A	10/21/20 19:26

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Hyannis, MA | Sample Description: | Work Order: 20J0175

Date Received: 10/5/2020

Field Sample #: HW-T(m) | Sampled: 10/1/2020 14:50

Sample ID: 20J0175-06

Sample Matrix: Water

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	23	2.0	0.64	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 19:47	JFC
Perfluorobutanesulfonic acid (PFBS)	1.8	2.0	0.50	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 19:47	JFC
Perfluoropentanoic acid (PFPeA)	120	20	4.2	ng/L	10		SOP 434-PFAAS	10/15/20	10/22/20 20:16	JFC
Perfluorohexanoic acid (PFHxA)	99	2.0	0.51	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 19:47	JFC
Perfluorohexanesulfonic acid (PFHxS)	19	2.0	0.77	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 19:47	JFC
Perfluoroheptanoic acid (PFHpA)	22	2.0	0.53	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 19:47	JFC
Perfluoroheptanesulfonic acid (PFHpS)	ND	2.0	1.0	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 19:47	JFC
Perfluorooctanoic acid (PFOA)	11	2.0	0.71	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 19:47	JFC
Perfluorooctanesulfonic acid (PFOS)	25	2.0	0.68	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 19:47	JFC
Perfluorooctanesulfonamide (FOSA)	ND	2.0	0.83	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 19:47	JFC
6:2 Fluorotelomersulfonic acid (6:2FTS A)	ND	2.0	0.39	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 19:47	JFC
Perfluorononanoic acid (PFNA)	3.2	2.0	0.63	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 19:47	JFC
Perfluorodecanoic acid (PFDA)	1.4	2.0	0.62	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 19:47	JFC
Perfluorodecanesulfonic acid (PFDS)	ND	2.0	0.51	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 19:47	JFC
N-EtFOSAA	ND	2.0	0.70	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 19:47	JFC
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	2.0	1.1	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 19:47	JFC
Perfluoroundecanoic acid (PFUnA)	ND	2.0	0.49	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 19:47	JFC
N-MeFOSAA	ND	2.0	0.62	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 19:47	JFC
Perfluorododecanoic acid (PFDoA)	ND	2.0	0.50	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 19:47	JFC
Perfluorotridecanoic acid (PFTrDA)	ND	2.0	0.67	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 19:47	JFC
Perfluorotetradecanoic acid (PFTA)	ND	2.0	0.50	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 19:47	JFC

Surrogates	% Recovery		Recovery Limits	Flag/Qual	
13C-PFHxA	73.8		70-130		10/21/20 19:47
13C-PFHxA		*	70-130	S-01, U	10/22/20 20:16
13C-PFDA	77.9		70-130		10/21/20 19:47
13C-PFDA		*	70-130	S-01, U	10/22/20 20:16
d5-NEtFOSAA	76.7		70-130		10/21/20 19:47
d5-NEtFOSAA		*	70-130	S-01, U	10/22/20 20:16

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Hyannis, MA | Sample Description: | Work Order: 20J0175

Date Received: 10/5/2020

Field Sample #: HW-T(s) | Sampled: 10/1/2020 15:00

Sample ID: 20J0175-07

Sample Matrix: Water

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	1.9	2.0	0.64	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 20:09	JFC
Perfluorobutanesulfonic acid (PFBS)	10	2.0	0.50	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 20:09	JFC
Perfluoropentanoic acid (PFPeA)	6.4	2.0	0.42	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 20:09	JFC
Perfluorohexanoic acid (PFHxA)	30	2.0	0.51	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 20:09	JFC
Perfluorohexanesulfonic acid (PFHxS)	170	2.0	0.77	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 20:09	JFC
Perfluoroheptanoic acid (PFHpA)	3.9	2.0	0.53	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 20:09	JFC
Perfluoroheptanesulfonic acid (PFHpS)	1.5	2.0	1.0	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 20:09	JFC
Perfluorooctanoic acid (PFOA)	6.7	2.0	0.71	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 20:09	JFC
Perfluorooctanesulfonic acid (PFOS)	210	20	6.8	ng/L	10		SOP 434-PFAAS	10/15/20	10/24/20 20:06	JFC
Perfluorooctanesulfonamide (FOSA)	ND	2.0	0.83	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 20:09	JFC
6:2 Fluorotelomersulfonic acid (6:2FTS A)	ND	2.0	0.39	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 20:09	JFC
Perfluorononanoic acid (PFNA)	0.74	2.0	0.63	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 20:09	JFC
Perfluorodecanoic acid (PFDA)	ND	2.0	0.62	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 20:09	JFC
Perfluorodecanesulfonic acid (PFDS)	ND	2.0	0.51	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 20:09	JFC
N-EtFOSAA	ND	2.0	0.70	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 20:09	JFC
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	2.0	1.1	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 20:09	JFC
Perfluoroundecanoic acid (PFUnA)	ND	2.0	0.49	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 20:09	JFC
N-MeFOSAA	ND	2.0	0.62	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 20:09	JFC
Perfluorododecanoic acid (PFDoA)	ND	2.0	0.50	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 20:09	JFC
Perfluorotridecanoic acid (PFTrDA)	ND	2.0	0.67	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 20:09	JFC
Perfluorotetradecanoic acid (PFTA)	ND	2.0	0.50	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 20:09	JFC

Surrogates	% Recovery		Recovery Limits	Flag/Qual	
13C-PFHxA	81.8		70-130		10/21/20 20:09
13C-PFHxA		*	70-130	S-01, U	10/24/20 20:06
13C-PFDA	77.6		70-130		10/21/20 20:09
13C-PFDA		*	70-130	S-01, U	10/24/20 20:06
d5-NEtFOSAA	75.5		70-130		10/21/20 20:09
d5-NEtFOSAA		*	70-130	S-01, U	10/24/20 20:06

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Hyannis, MA | Sample Description: | Work Order: 20J0175

Date Received: 10/5/2020

Field Sample #: HW-S(s) | Sampled: 10/1/2020 15:50

Sample ID: 20J0175-08

Sample Matrix: Water

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	86	2.0	0.64	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 20:31	JFC
Perfluorobutanesulfonic acid (PFBS)	6.1	2.0	0.50	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 20:31	JFC
Perfluoropentanoic acid (PFPeA)	420	100	21	ng/L	50		SOP 434-PFAAS	10/15/20	10/22/20 20:37	JFC
Perfluorohexanoic acid (PFHxA)	250	100	25	ng/L	50		SOP 434-PFAAS	10/15/20	10/22/20 20:37	JFC
Perfluorohexanesulfonic acid (PFHxS)	55	2.0	0.77	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 20:31	JFC
Perfluoroheptanoic acid (PFHpA)	110	100	27	ng/L	50		SOP 434-PFAAS	10/15/20	10/22/20 20:37	JFC
Perfluoroheptanesulfonic acid (PFHpS)	6.7	2.0	1.0	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 20:31	JFC
Perfluorooctanoic acid (PFOA)	62	2.0	0.71	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 20:31	JFC
Perfluorooctanesulfonic acid (PFOS)	100	2.0	0.68	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 20:31	JFC
Perfluorooctanesulfonamide (FOSA)	ND	2.0	0.83	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 20:31	JFC
6:2 Fluorotelomersulfonic acid (6:2FTS A)	3700	100	20	ng/L	50		SOP 434-PFAAS	10/15/20	10/22/20 20:37	JFC
Perfluorononanoic acid (PFNA)	100	2.0	0.63	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 20:31	JFC
Perfluorodecanoic acid (PFDA)	ND	2.0	0.62	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 20:31	JFC
Perfluorodecanesulfonic acid (PFDS)	ND	2.0	0.51	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 20:31	JFC
N-EtFOSAA	ND	2.0	0.70	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 20:31	JFC
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	2.0	1.1	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 20:31	JFC
Perfluoroundecanoic acid (PFUnA)	ND	2.0	0.49	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 20:31	JFC
N-MeFOSAA	ND	2.0	0.62	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 20:31	JFC
Perfluorododecanoic acid (PFDoA)	ND	2.0	0.50	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 20:31	JFC
Perfluorotridecanoic acid (PFTrDA)	ND	2.0	0.67	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 20:31	JFC
Perfluorotetradecanoic acid (PFTA)	ND	2.0	0.50	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 20:31	JFC

Surrogates	% Recovery		Recovery Limits	Flag/Qual	
13C-PFHxA	73.4		70-130		10/21/20 20:31
13C-PFHxA		*	70-130	S-01, U	10/22/20 20:37
13C-PFDA	79.6		70-130		10/21/20 20:31
13C-PFDA		*	70-130	S-01, U	10/22/20 20:37
d5-NEtFOSAA	**69.0**	*	70-130	PF-01A	10/21/20 20:31
d5-NEtFOSAA		*	70-130	S-01, U	10/22/20 20:37

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Hyannis, MA | Sample Description: | Work Order: 20J0175

Date Received: 10/5/2020

Field Sample #: HW-S(m) | Sampled: 10/1/2020 16:00

Sample ID: 20J0175-09

Sample Matrix: Water

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	0.95	2.0	0.64	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 20:53	JFC
Perfluorobutanesulfonic acid (PFBS)	ND	2.0	0.50	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 20:53	JFC
Perfluoropentanoic acid (PFPeA)	ND	2.0	0.42	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 20:53	JFC
Perfluorohexanoic acid (PFHxA)	2.8	2.0	0.51	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 20:53	JFC
Perfluorohexanesulfonic acid (PFHxS)	6.4	2.0	0.77	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 20:53	JFC
Perfluoroheptanoic acid (PFHpA)	0.96	2.0	0.53	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 20:53	JFC
Perfluoroheptanesulfonic acid (PFHpS)	ND	2.0	1.0	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 20:53	JFC
Perfluorooctanoic acid (PFOA)	1.3	2.0	0.71	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 20:53	JFC
Perfluorooctanesulfonic acid (PFOS)	5.8	2.0	0.68	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 20:53	JFC
Perfluorooctanesulfonamide (FOSA)	ND	2.0	0.83	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 20:53	JFC
6:2 Fluorotelomersulfonic acid (6:2FTS A)	6.5	2.0	0.39	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 20:53	JFC
Perfluorononanoic acid (PFNA)	ND	2.0	0.63	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 20:53	JFC
Perfluorodecanoic acid (PFDA)	ND	2.0	0.62	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 20:53	JFC
Perfluorodecanesulfonic acid (PFDS)	ND	2.0	0.51	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 20:53	JFC
N-EtFOSAA	ND	2.0	0.70	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 20:53	JFC
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	2.0	1.1	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 20:53	JFC
Perfluoroundecanoic acid (PFUnA)	ND	2.0	0.49	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 20:53	JFC
N-MeFOSAA	ND	2.0	0.62	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 20:53	JFC
Perfluorododecanoic acid (PFDoA)	ND	2.0	0.50	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 20:53	JFC
Perfluorotridecanoic acid (PFTrDA)	ND	2.0	0.67	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 20:53	JFC
Perfluorotetradecanoic acid (PFTA)	ND	2.0	0.50	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 20:53	JFC

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
13C-PFHxA	77.2	70-130		10/21/20 20:53
13C-PFDA	76.9	70-130		10/21/20 20:53
d5-NEtFOSAA	71.5	70-130		10/21/20 20:53

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Hyannis, MA | Sample Description: | Work Order: 20J0175

Date Received: 10/5/2020

Field Sample #: HW-U(d) | Sampled: 10/2/2020 10:24

Sample ID: 20J0175-10

Sample Matrix: Water

1,4-Dioxane by isotope dilution GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
1,4-Dioxane	0.73	0.20	µg/L	1		SW-846 8270D-E	10/9/20	10/13/20 17:28	CLA

Surrogates	% Recovery	Recovery Limits	Flag/Qual				
1,4-Dioxane-d8	20.4	15-110				10/13/20 17:28	

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Project Location: Hyannis, MA | Sample Description: | Work Order: 20J0175

Date Received: 10/5/2020

Field Sample #: HW-U(d) | Sampled: 10/2/2020 10:24

Sample ID: 20J0175-10

Sample Matrix: Water

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	3.6	2.0	0.64	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 21:14	JFC
Perfluorobutanesulfonic acid (PFBS)	4.3	2.0	0.50	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 21:14	JFC
Perfluoropentanoic acid (PFPeA)	11	2.0	0.42	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 21:14	JFC
Perfluorohexanoic acid (PFHxA)	10	2.0	0.51	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 21:14	JFC
Perfluorohexanesulfonic acid (PFHxS)	18	2.0	0.77	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 21:14	JFC
Perfluoroheptanoic acid (PFHpA)	6.2	2.0	0.53	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 21:14	JFC
Perfluoroheptanesulfonic acid (PFHpS)	ND	2.0	1.0	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 21:14	JFC
Perfluorooctanoic acid (PFOA)	10	2.0	0.71	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 21:14	JFC
Perfluorooctanesulfonic acid (PFOS)	23	2.0	0.68	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 21:14	JFC
Perfluorooctanesulfonamide (FOSA)	ND	2.0	0.83	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 21:14	JFC
6:2 Fluorotelomersulfonic acid (6:2FTS A)	1.2	2.0	0.39	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 21:14	JFC
Perfluorononanoic acid (PFNA)	1.6	2.0	0.63	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 21:14	JFC
Perfluorodecanoic acid (PFDA)	ND	2.0	0.62	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 21:14	JFC
Perfluorodecanesulfonic acid (PFDS)	ND	2.0	0.51	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 21:14	JFC
N-EtFOSAA	ND	2.0	0.70	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 21:14	JFC
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	2.0	1.1	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 21:14	JFC
Perfluoroundecanoic acid (PFUnA)	ND	2.0	0.49	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 21:14	JFC
N-MeFOSAA	ND	2.0	0.62	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 21:14	JFC
Perfluorododecanoic acid (PFDoA)	ND	2.0	0.50	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 21:14	JFC
Perfluorotridecanoic acid (PFTrDA)	ND	2.0	0.67	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 21:14	JFC
Perfluorotetradecanoic acid (PFTA)	ND	2.0	0.50	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 21:14	JFC

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
13C-PFHxA	84.2	70-130		10/21/20 21:14
13C-PFDA	81.5	70-130		10/21/20 21:14
d5-NEtFOSAA	74.0	70-130		10/21/20 21:14

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Hyannis, MA
Sample Description:
Work Order: 20J0175

Date Received: 10/5/2020

Field Sample #: HW-V(m)
Sampled: 10/2/2020 11:20

Sample ID: 20J0175-11

Sample Matrix: Water

1,4-Dioxane by isotope dilution GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
1,4-Dioxane	0.80	0.20	µg/L	1		SW-846 8270D-E	10/9/20	10/13/20 17:08	CLA

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
1,4-Dioxane-d8	20.1	15-110		10/13/20 17:08

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Hyannis, MA | Sample Description: | Work Order: 20J0175

Date Received: 10/5/2020

Field Sample #: HW-V(m) | Sampled: 10/2/2020 11:20

Sample ID: 20J0175-11

Sample Matrix: Water

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	3.8	2.0	0.64	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 21:58	JFC
Perfluorobutanesulfonic acid (PFBS)	6.8	2.0	0.50	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 21:58	JFC
Perfluoropentanoic acid (PFPeA)	14	2.0	0.42	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 21:58	JFC
Perfluorohexanoic acid (PFHxA)	9.3	2.0	0.51	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 21:58	JFC
Perfluorohexanesulfonic acid (PFHxS)	3.2	2.0	0.77	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 21:58	JFC
Perfluoroheptanoic acid (PFHpA)	3.3	2.0	0.53	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 21:58	JFC
Perfluoroheptanesulfonic acid (PFHpS)	ND	2.0	1.0	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 21:58	JFC
Perfluorooctanoic acid (PFOA)	6.3	2.0	0.71	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 21:58	JFC
Perfluorooctanesulfonic acid (PFOS)	5.9	2.0	0.68	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 21:58	JFC
Perfluorooctanesulfonamide (FOSA)	ND	2.0	0.83	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 21:58	JFC
6:2 Fluorotelomersulfonic acid (6:2FTS A)	ND	2.0	0.39	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 21:58	JFC
Perfluorononanoic acid (PFNA)	1.7	2.0	0.63	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 21:58	JFC
Perfluorodecanoic acid (PFDA)	ND	2.0	0.62	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 21:58	JFC
Perfluorodecanesulfonic acid (PFDS)	ND	2.0	0.51	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 21:58	JFC
N-EtFOSAA	ND	2.0	0.70	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 21:58	JFC
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	2.0	1.1	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 21:58	JFC
Perfluoroundecanoic acid (PFUnA)	ND	2.0	0.49	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 21:58	JFC
N-MeFOSAA	ND	2.0	0.62	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 21:58	JFC
Perfluorododecanoic acid (PFDoA)	ND	2.0	0.50	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 21:58	JFC
Perfluorotridecanoic acid (PFTrDA)	ND	2.0	0.67	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 21:58	JFC
Perfluorotetradecanoic acid (PFTA)	ND	2.0	0.50	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 21:58	JFC

Surrogates	% Recovery		Recovery Limits	Flag/Qual	
13C-PFHxA	71.8		70-130		10/21/20 21:58
13C-PFDA	71.3		70-130		10/21/20 21:58
d5-NEtFOSAA	**59.1**	*	70-130	PF-01A	10/21/20 21:58

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Hyannis, MA | Sample Description: | Work Order: 20J0175

Date Received: 10/5/2020

Field Sample #: OW-9(dd) | Sampled: 10/2/2020 15:38

Sample ID: 20J0175-12

Sample Matrix: Water

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	5.2	2.0	0.64	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 22:20	JFC
Perfluorobutanesulfonic acid (PFBS)	1.3	2.0	0.50	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 22:20	JFC
Perfluoropentanoic acid (PFPeA)	22	2.0	0.42	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 22:20	JFC
Perfluorohexanoic acid (PFHxA)	16	2.0	0.51	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 22:20	JFC
Perfluorohexanesulfonic acid (PFHxS)	19	2.0	0.77	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 22:20	JFC
Perfluoroheptanoic acid (PFHpA)	8.5	2.0	0.53	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 22:20	JFC
Perfluoroheptanesulfonic acid (PFHpS)	ND	2.0	1.0	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 22:20	JFC
Perfluorooctanoic acid (PFOA)	10	2.0	0.71	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 22:20	JFC
Perfluorooctanesulfonic acid (PFOS)	49	2.0	0.68	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 22:20	JFC
Perfluorooctanesulfonamide (FOSA)	ND	2.0	0.83	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 22:20	JFC
6:2 Fluorotelomersulfonic acid (6:2FTS A)	20	2.0	0.39	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 22:20	JFC
Perfluorononanoic acid (PFNA)	18	2.0	0.63	ng/L	1		SOP 434-PFAAS	10/15/20	10/21/20 22:20	JFC
Perfluorodecanoic acid (PFDA)	ND	2.0	0.62	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 22:20	JFC
Perfluorodecanesulfonic acid (PFDS)	ND	2.0	0.51	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 22:20	JFC
N-EtFOSAA	ND	2.0	0.70	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 22:20	JFC
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	2.0	1.1	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 22:20	JFC
Perfluoroundecanoic acid (PFUnA)	ND	2.0	0.49	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 22:20	JFC
N-MeFOSAA	ND	2.0	0.62	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 22:20	JFC
Perfluorododecanoic acid (PFDoA)	ND	2.0	0.50	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 22:20	JFC
Perfluorotridecanoic acid (PFTrDA)	ND	2.0	0.67	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 22:20	JFC
Perfluorotetradecanoic acid (PFTA)	ND	2.0	0.50	ng/L	1	U	SOP 434-PFAAS	10/15/20	10/21/20 22:20	JFC

Surrogates	% Recovery		Recovery Limits	Flag/Qual	
13C-PFHxA	79.7		70-130		10/21/20 22:20
13C-PFDA	73.7		70-130		10/21/20 22:20
d5-NEtFOSAA	**59.3**	*	70-130	PF-01A	10/21/20 22:20

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Sample Extraction Data

Prep Method: SOP 434-PFAAS **Analytical Method: SOP 434-PFAAS**

Lab Number [Field ID]	Batch	Initial [mL]	Final [mL]	Date
20J0175-01 [HW-P(s)]	B268752	250	1.00	10/15/20
20J0175-01RE1 [HW-P(s)]	B268752	250	1.00	10/15/20
20J0175-02 [HW-P(m)]	B268752	250	1.00	10/15/20
20J0175-03 [HW-Q(S)]	B268752	250	1.00	10/15/20
20J0175-04 [HW-Q(m)]	B268752	250	1.00	10/15/20
20J0175-05 [HW-R]	B268752	250	1.00	10/15/20
20J0175-06 [HW-T(m)]	B268752	250	1.00	10/15/20
20J0175-06RE1 [HW-T(m)]	B268752	250	1.00	10/15/20
20J0175-07 [HW-T(s)]	B268752	250	1.00	10/15/20
20J0175-07RE1 [HW-T(s)]	B268752	250	1.00	10/15/20
20J0175-08 [HW-S(s)]	B268752	250	1.00	10/15/20
20J0175-08RE1 [HW-S(s)]	B268752	250	1.00	10/15/20
20J0175-09 [HW-S(m)]	B268752	250	1.00	10/15/20
20J0175-10 [HW-U(d)]	B268752	250	1.00	10/15/20
20J0175-11 [HW-V(m)]	B268752	250	1.00	10/15/20
20J0175-12 [OW-9(dd)]	B268752	250	1.00	10/15/20

Prep Method: SW-846 3510C **Analytical Method: SW-846 8270D-E**

Lab Number [Field ID]	Batch	Initial [mL]	Final [mL]	Date
20J0175-10 [HW-U(d)]	B268322	1020	1.00	10/09/20
20J0175-11 [HW-V(m)]	B268322	1000	1.00	10/09/20

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

QUALITY CONTROL

1,4-Dioxane by isotope dilution GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B268322 - SW-846 3510C										
Blank (B268322-BLK1)				Prepared: 10/09/20 Analyzed: 10/13/20						
1,4-Dioxane	ND	0.20	µg/L							
Surrogate: 1,4-Dioxane-d8	*1.77*		µg/L	10.0		17.7	15-110			
LCS (B268322-BS1)				Prepared: 10/09/20 Analyzed: 10/13/20						
1,4-Dioxane	10.2	0.20	µg/L	10.0		102	40-140			
Surrogate: 1,4-Dioxane-d8	*2.12*		µg/L	10.0		21.2	15-110			
LCS Dup (B268322-BSD1)				Prepared: 10/09/20 Analyzed: 10/13/20						
1,4-Dioxane	10.5	0.20	µg/L	10.0		105	40-140	2.64	30	
Surrogate: 1,4-Dioxane-d8	*2.00*		µg/L	10.0		20.0	15-110			

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QUALITY CONTROL

Semivolatile Organic Compounds by - LC/MS-MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B268752 - SOP 434-PFAAS										
Blank (B268752-BLK1)				Prepared: 10/15/20 Analyzed: 10/21/20						
Perfluorobutanoic acid (PFBA)	ND	2.0	ng/L							U
Perfluorobutanesulfonic acid (PFBS)	ND	2.0	ng/L							U
Perfluoropentanoic acid (PFPeA)	ND	2.0	ng/L							U
Perfluorohexanoic acid (PFHxA)	ND	2.0	ng/L							U
Perfluorohexanesulfonic acid (PFHxS)	ND	2.0	ng/L							U
Perfluoroheptanoic acid (PFHpA)	ND	2.0	ng/L							U
Perfluoroheptanesulfonic acid (PFHpS)	ND	2.0	ng/L							U
Perfluorooctanoic acid (PFOA)	ND	2.0	ng/L							U
Perfluorooctanesulfonic acid (PFOS)	ND	2.0	ng/L							U
Perfluorooctanesulfonamide (FOSA)	ND	2.0	ng/L							U
6:2 Fluorotelomersulfonic acid (6:2FTS A)	ND	2.0	ng/L							U
Perfluorononanoic acid (PFNA)	ND	2.0	ng/L							U
Perfluorodecanoic acid (PFDA)	ND	2.0	ng/L							U
Perfluorodecanesulfonic acid (PFDS)	ND	2.0	ng/L							U
N-EtFOSAA	ND	2.0	ng/L							U
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	2.0	ng/L							U
Perfluoroundecanoic acid (PFUnA)	ND	2.0	ng/L							U
N-MeFOSAA	ND	2.0	ng/L							U
Perfluorododecanoic acid (PFDoA)	ND	2.0	ng/L							U
Perfluorotridecanoic acid (PFTrDA)	ND	2.0	ng/L							U
Perfluorotetradecanoic acid (PFTA)	ND	2.0	ng/L							U
Surrogate: 13C-PFHxA	*35.6*		ng/L	40.0		88.9	70-130			
Surrogate: 13C-PFDA	*35.6*		ng/L	40.0		89.0	70-130			
Surrogate: d5-NEtFOSAA	*145*		ng/L	160		90.4	70-130			
LCS (B268752-BS1)				Prepared: 10/15/20 Analyzed: 10/21/20						
Perfluorobutanoic acid (PFBA)	1.48	2.0	ng/L	2.00		73.9	50-150			
Perfluorobutanesulfonic acid (PFBS)	1.60	2.0	ng/L	1.77		90.6	50-150			
Perfluoropentanoic acid (PFPeA)	1.83	2.0	ng/L	2.00		91.4	50-150			
Perfluorohexanoic acid (PFHxA)	1.82	2.0	ng/L	2.00		90.8	50-150			
Perfluorohexanesulfonic acid (PFHxS)	1.51	2.0	ng/L	1.82		82.7	50-150			
Perfluoroheptanoic acid (PFHpA)	1.66	2.0	ng/L	2.00		82.9	50-150			
Perfluoroheptanesulfonic acid (PFHpS)	1.89	2.0	ng/L	1.90		99.5	50-150			
Perfluorooctanoic acid (PFOA)	1.75	2.0	ng/L	2.00		87.6	50-150			
Perfluorooctanesulfonic acid (PFOS)	1.70	2.0	ng/L	1.85		91.7	50-150			
Perfluorooctanesulfonamide (FOSA)	1.53	2.0	ng/L	2.00		76.5	50-150			
6:2 Fluorotelomersulfonic acid (6:2FTS A)	1.98	2.0	ng/L	1.90		104	50-150			
Perfluorononanoic acid (PFNA)	1.67	2.0	ng/L	2.00		83.7	50-150			
Perfluorodecanoic acid (PFDA)	1.39	2.0	ng/L	2.00		69.5	50-150			
Perfluorodecanesulfonic acid (PFDS)	1.69	2.0	ng/L	1.93		87.8	50-150			
N-EtFOSAA	1.85	2.0	ng/L	2.00		92.3	50-150			
8:2 Fluorotelomersulfonic acid (8:2FTS A)	1.85	2.0	ng/L	1.92		96.6	50-150			
Perfluoroundecanoic acid (PFUnA)	1.63	2.0	ng/L	2.00		81.4	50-150			
N-MeFOSAA	1.72	2.0	ng/L	2.00		86.1	50-150			
Perfluorododecanoic acid (PFDoA)	1.54	2.0	ng/L	2.00		76.9	50-150			
Perfluorotridecanoic acid (PFTrDA)	1.58	2.0	ng/L	2.00		78.9	50-150			
Perfluorotetradecanoic acid (PFTA)	1.31	2.0	ng/L	2.00		65.5	50-150			
Surrogate: 13C-PFHxA	*34.4*		ng/L	40.0		85.9	70-130			
Surrogate: 13C-PFDA	*34.5*		ng/L	40.0		86.3	70-130			
Surrogate: d5-NEtFOSAA	*136*		ng/L	160		84.9	70-130			

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FLAG/QUALIFIER SUMMARY

*	QC result is outside of established limits.
†	Wide recovery limits established for difficult compound.
‡	Wide RPD limits established for difficult compound.
#	Data exceeded client recommended or regulatory level
ND	Not Detected
RL	Reporting Limit is at the level of quantitation (LOQ)
DL	Detection Limit is the lower limit of detection determined by the MDL study
MCL	Maximum Contaminant Level
	Percent recoveries and relative percent differences (RPDs) are determined by the software using values in the calculation which have not been rounded.
	No results have been blank subtracted unless specified in the case narrative section.
PF-01A	Surrogate recovery is outside of control limits. Sample not re-extracted past holding time.
S-01	The surrogate recovery for this sample is not available due to sample dilution below the surrogate reporting limit required from high analyte concentration and/or matrix interferences.
U	Analyte included in the analysis, but not detected

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
SOP 434-PFAAS in Water	
Perfluorobutanoic acid (PFBA)	NH-P
Perfluorobutanesulfonic acid (PFBS)	NH-P
Perfluoropentanoic acid (PFPeA)	NH-P
Perfluorohexanoic acid (PFHxA)	NH-P
Perfluorohexanesulfonic acid (PFHxS)	NH-P
Perfluoroheptanoic acid (PFHpA)	NH-P
Perfluorooctanoic acid (PFOA)	NH-P
Perfluorooctanesulfonic acid (PFOS)	NH-P
6:2 Fluorotelomersulfonic acid (6:2FTS A)	NH-P
Perfluorononanoic acid (PFNA)	NH-P
Perfluorodecanoic acid (PFDA)	NH-P
N-EtFOSAA	NH-P
8:2 Fluorotelomersulfonic acid (8:2FTS A)	NH-P
Perfluoroundecanoic acid (PFUnA)	NH-P
N-MeFOSAA	NH-P
Perfluorododecanoic acid (PFDoA)	NH-P
Perfluorotridecanoic acid (PFTrDA)	NH-P
Perfluorotetradecanoic acid (PFTA)	NH-P
SW-846 8270D-E in Water	
1,4-Dioxane	NY

The CON-TEST Environmental Laboratory operates under the following certifications and accreditations:

Code	Description	Number	Expires
AIHA	AIHA-LAP, LLC - ISO17025:2017	100033	03/1/2022
MA	Massachusetts DEP	M-MA100	06/30/2021
CT	Connecticut Department of Publilc Health	PH-0567	09/30/2021
NY	New York State Department of Health	10899 NELAP	04/1/2021
NH-S	New Hampshire Environmental Lab	2516 NELAP	02/5/2021
RI	Rhode Island Department of Health	LAO00112	12/30/2020
NC	North Carolina Div. of Water Quality	652	12/31/2020
NJ	New Jersey DEP	MA007 NELAP	06/30/2021
FL	Florida Department of Health	E871027 NELAP	06/30/2021
VT	Vermont Department of Health Lead Laboratory	LL015036	07/30/2021
ME	State of Maine	2011028	06/9/2021
VA	Commonwealth of Virginia	460217	12/14/2020
NH-P	New Hampshire Environmental Lab	2557 NELAP	09/6/2021
VT-DW	Vermont Department of Health Drinking Water	VT-255716	06/12/2021
NC-DW	North Carolina Department of Health	25703	07/31/2021
PA	Commonwealth of Pennsylvania DEP	68-05812	06/30/2021
MI	Dept. of Env, Great Lakes, and Energy	9100	09/6/2021

20J0175

con-test ANALYTICAL LABORATORY

Phone: 413-525-2332
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Email: info@contestlabs.com

http://www.contestlabs.com

CHAIN OF CUSTODY RECORD

39 Spruce Street
East Longmeadow, MA 01028

Doc # 381 Rev 2_06262019

Company Name: Horsley Witten Group
Address: 90 Route 6A Sandwich MA 02563
Phone: (508) 833-6600
Project Name: Barnstable Municipal Airport
Project Location: Hyannis, MA
Project Number: 20102
Project Manager: Bryan Massa
Con-Test Quote Name/Number:
Invoice Recipient:
Sampled By: Sarah Bartlett + Mike Demarche

Requested Turnaround Time
7-Day ☐ 10-Day ☐
PFAS 10-Day (std) ☑ Due Date:

Rush-Approval Required
1-Day ☐ 3-Day ☐
2-Day ☐ 4-Day ☐

Dissolved Metals Samples
○ Field Filtered
○ Lab to Filter

Orthophosphate Samples
○ Field Filtered
○ Lab to Filter

Data Delivery
Format: PDF ☑ EXCEL ☑
Other:
CLP Like Data Pkg Required: ☐
Email To: bmassa@horsleywitten.com
Fax To #:

ANALYSIS REQUESTED

Con-Test Work Order#	Client Sample ID / Description	Beginning Date/Time	Ending Date/Time	COMP/GRAB	[1]Matrix Code	Conc Code	VIALS	GLASS	PLASTIC	BACTERIA	ENCORE	PFAS - All
1	HW-P (s)	10/1/20	11:33	G	AQ				✓			✓
2	HW-P (m)	10/1/20	11:35	G	AQ				✓			✓
3	HW-Q (s)	10/1/20	13:12	G	AQ				✓			✓
4	HW-Q (m)	10/1/20	13:10	G	AQ				✓			✓
5	HW-R	10/1/20	14:00	G	AQ				✓			✓
6	HW-T (m)	10/1/20	14:50	G	AQ				✓			✓
7	HW-T (s)	10/1/20	15:00	G	AQ				✓			✓
8	HW-S (s)	10/1/20	15:50	G	AQ				✓			✓
9	HW-S (m)	10/1/20	16:00	G	AQ				✓			✓

[2] Preservation Code

Cooler Temp Only

Total Number Of:
VIALS_____
GLASS_____
PLASTIC_____
BACTERIA_____
ENCORE_____

Glassware in the fridge? Y / N

Glassware in freezer? Y / N

Prepackaged Cooler? Y / N

*Contest is not responsible for missing samples from prepacked coolers

[1] Matrix Codes:
GW = Ground Water
WW = Waste Water
DW = Drinking Water
A = Air
S = Soil
SL = Sludge
SOL = Solid
O = Other (please define)

[2] Preservation Codes:
I = Iced
H = HCL
M = Methanol
N = Nitric Acid
S = Sulfuric Acid
B = Sodium Bisulfate
X = Sodium Hydroxide
T = Sodium Thiosulfate
O = Other (please define)

Relinquished by: (signature)	Date/Time:
M. Wilson	10/5/20 1135
Received by: (signature)	Date/Time:
Paul Chartoney	10-5-20 1135
Relinquished by: (signature)	Date/Time:
Paul Chartoney	10-5-20 1820
Received by: (signature)	Date/Time:
[illegible]	10/5/20 1822
Relinquished by: (signature)	Date/Time:
[illegible]	10/5/20 2300
Received by: (signature)	Date/Time:
[illegible]	10/5/20 2000
Relinquished by: (signature)	Date/Time:
Received by: (signature)	Date/Time:

Client Comments:

Detection Limit Requirements
MA
CT
Other

Special Requirements
☑ MCP Required
MCP Certification Form Required
☐ CT RCP Required
RCP Certification Form Required
☐ MA State DW Required
PWSID #

Please use the following codes to indicate possible sample concentration within the Conc Code column above:
H - High; M - Medium; L - Low; C - Clean; U - Unknown

NELAC and AIHA-LAP, LLC Accredited

Project Entity
Government ☐ Municipality ☐ MWRA ☐ WRTA ☐
Federal ☐ 21 J ☐ School ☐
City ☐ Brownfield ☐ MBTA ☐

Other
☐ Chromatogram
☐ AIHA-LAP,LLC

PCB ONLY
☐ Soxhlet
☐ Non Soxhlet

Comments:

Disclaimer: Con-Test Labs is not responsible for any omitted information on the Chain of Custody. The Chain of Custody is a legal document that must be complete and accurate and is used to determine what analyses the laboratory will perform. Any missing information is not the laboratory's responsibility. Con-Test values your partnership on each project and will try to assist with missing information, but will not be held accountable.

Table of Contents

2030175

con-test ANALYTICAL LABORATORY

Phone: 413-525-2332
Fax: 413-525-6405
Email: info@contestlabs.com

http://www.contestlabs.com

CHAIN OF CUSTODY RECORD

39 Spruce Street
East Longmeadow, MA 01028

Doc # 381 Rev 2_06262019

Company Name: Horsley Witten Group
Address: 90 Route 6A Sandwich MA 02563
Phone: (508) 833-6600
Project Name: Barnstable Airport
Project Location: Hyannis MA
Project Number: 20102
Project Manager: Bryan Massa
Con-Test Quote Name/Number:
Invoice Recipient:
Sampled By: HW. SB + MO

Requested Turnaround Time				Dissolved Metals Samples	
7-Day	☐	10-Day	☐	○	Field Filtered
PFAS 10-Day (std)	✓	Due Date:		○	Lab to Filter
Rush Approval Required				**Orthophosphate Samples**	
1-Day	☐	3-Day	☐	○	Field Filtered
2-Day	☐	4-Day	☐	○	Lab to Filter

Data Delivery
Format: PDF ✓ EXCEL ☐
Other:
CLP Like Data Pkg Required: ☐
Email To: Dmassa@horsleywitten.com
Fax To #:

ANALYSIS REQUESTED

Con-Test Work Order#	Client Sample ID / Description	Beginning Date/Time	Ending Date/Time	COMP/GRAB	[1]Matrix Code	Conc Code	VIALS	GLASS	PLASTIC	BACTERIA	ENCORE	PFAS - All	1,4-Dioxane
10	HW-U(d)	10/2/20	10:24	Grab	AQ			✓	✓			✓	✓
11	HW-V(m)	10/2/20	11:20	Grab	AQ			✓	✓			✓	✓
12	HW-9(dd)	10/2/20	13:38	Grab	AQ			✓	✓			✓	

[2] Preservation Code

Soniclear Use Only
Total Number Of:
VIALS_____
GLASS_____
PLASTIC_____
BACTERIA_____
ENCORE_____

Glassware in the fridge? Y / N
Glassware in freezer? Y / N
Prepackaged Cooler? Y / N
*Contest is not responsible for missing samples from prepacked coolers

[1] Matrix Codes:
GW = Ground Water
WW = Waste Water
DW = Drinking Water
A = Air
S = Soil
SL = Sludge
SOL = Solid
O = Other (please define)

[2] Preservation Codes:
I = Iced
H = HCL
M = Methanol
N = Nitric Acid
S = Sulfuric Acid
B = Sodium Bisulfate
X = Sodium Hydroxide
T = Sodium Thiosulfate
O = Other (please define)

Relinquished by: (signature)	Date/Time:
	10/5/20 1135
Received by: (signature)	Date/Time:
	10-5-20 1135
Relinquished by: (signature)	Date/Time:
	10-5-20 18:20
Received by: (signature)	Date/Time:
	10/5/20 1823
Relinquished by: (signature)	Date/Time:
	10/5/20 2050
Received by: (signature)	Date/Time:
	2.0 10/5/20 2050
Relinquished by: (signature)	Date/Time:
Received by: (signature)	Date/Time:

Client Comments:

Detection Limit Requirements
MA
Other:

Special Requirements
MA MCP Required ✓
MCP Certification Form Required
CT RCP Required ☐
RCP Certification Form Required
MA State DW Required ☐
PWSID #

Please use the following codes to indicate possible sample concentration within the Conc Code column above:
H - High; M - Medium; L - Low; C - Clean; U - Unknown

NELAC and AIHA-LAP, LLC Accredited

Project Entity
Government ☐ Municipality ☐ MWRA ☐ WRTA ☐
Federal ☐ 21 J ☐ School ☐
City ☐ Brownfield ☐ MBTA ☐

Other
☐ Chromatogram
☐ AIHA-LAP,LLC

PCB ONLY
☐ Soxhlet
☐ Non Soxhlet

Comments:

Disclaimer: Con-Test Labs is not respon ble for any omitted information on the Chain of Custody. The Chain of Custody is a legal document tha must be complete and accurate and is used to determine wha analyses the laboratory will perform. An missing information is not the laboratory's responsibility. Co Test values your partnership on each pro ct and will try to assist with missing information, but will not held accountable.

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I Have Not Confirmed Sample Container Numbers With Lab Staff Before Relinquishing Over Samples_____

con-test® ANALYTICAL LABORATORY

Doc# 277 Rev 5 2017

Login Sample Receipt Checklist - (Rejection Criteria Listing - Using Acceptance Policy) Any False Statement will be brought to the attention of the Client - State True or False

Client Horsley Witten

Received By _____ Date 10/5/20 Time 2000

How were the samples received? In Cooler T No Cooler _____ On Ice T No Ice _____ Direct from Sampling _____ Ambient _____ Melted Ice _____

Were samples within Temperature? 2-6°C T By Gun # 4 Actual Temp - 2.0 By Blank # _____ Actual Temp - _____

Was Custody Seal Intact? n/a Were Samples Tampered with? n/a

Was COC Relinquished ? T Does Chain Agree With Samples? T

Are there broken/leaking/loose caps on any samples? F

Is COC in ink/ Legible? T Were samples received within holding time? T

Did COC include all pertinent Information? Client T Analysis T Sampler Name T Project T ID's T Collection Dates/Times T

Are Sample labels filled out and legible? T

Are there Lab to Filters? F Who was notified? _____

Are there Rushes? F Who was notified? _____

Are there Short Holds? F Who was notified? _____

Is there enough Volume? T

Is there Headspace where applicable? n/a MS/MSD? F

Proper Media/Containers Used? T Is splitting samples required? F

Were trip blanks received? F On COC? F

Do all samples have the proper pH? Acid n/a Base n/a

Vials	#	Containers:	#		#		#
Unp-		1 Liter Amb.	2	1 Liter Plastic		16 oz Amb.	
HCL-		500 mL Amb.		500 mL Plastic		8oz Amb/Clear	
Meoh-		250 mL Amb.		250 mL Plastic	24	4oz Amb/Clear	
Bisulfate-		Flashpoint		Col./Bacteria		2oz Amb/Clear	
DI-		Other Glass		Other Plastic		Encore	
Thiosulfate-		SOC Kit		Plastic Bag		Frozen:	
Sulfuric-		Perchlorate		Ziplock			

Unused Media

Vials	#	Containers:	#		#		#
Unp-		1 Liter Amb.		1 Liter Plastic		16 oz Amb.	
HCL-		500 mL Amb.		500 mL Plastic		8oz Amb/Clear	
Meoh-		250 mL Amb.		250 mL Plastic		4oz Amb/Clear	
Bisulfate-		Col./Bacteria		Flashpoint		2oz Amb/Clear	
DI-		Other Plastic		Other Glass		Encore	
Thiosulfate-		SOC Kit		Plastic Bag		Frozen:	
Sulfuric-		Perchlorate		Ziplock			

Comments:

MADEP MCP Analytical Method Report Certification Form

Laboratory Name: Con-Test Analytical Laboratory	Project #: 20J0175
Project Location: Hyannis, MA	RTN:

This Form provides certifications for the following data set: [list Laboratory Sample ID Number(s)]

20J0175-01 thru 20J0175-12

Matrices: Water

CAM Protocol (check all that below)

8260 VOC CAM II A ( )	7470/7471 Hg CAM IIIB ( )	MassDEP VPH CAM IV A ( )	8082 PCB CAM V A ( )	9014 Total Cyanide/PAC CAM VI A ( )	6860 Perchlorate CAM VIII B ( )
8270 SVOC CAM II B (X)	7010 Metals CAM III C ( )	MassDEP VPH CAM IV C ( )	8081 Pesticides CAM V B ( )	7196 Hex Cr CAM VI B ( )	MassDEP APH CAM IX A ( )
6010 Metals CAM III A ( )	6020 Metals CAM III D ( )	MassDEP EPH CAM IV B ( )	8151 Herbicides CAM V C ( )	8330 Explosives CAM VIII A ( )	TO-15 VOC CAM IX B ( )

Affirmative response to Questions A throughF is required for "Presumptive Certainty" status

A	Were all samples received in a condition consistent with those described on the Chain-of-Custody, properly preserved (including temperature) in the field or laboratory, and prepared/analyzed within method holding times?	☑ Yes	☐ No[1]
B	Were the analytical method(s) and all associated QC requirements specificed in the selected CAM protocol(s) followed?	☑ Yes	☐ No[1]
C	Were all required corrective actions and analytical response actions specified in the selected CAM protocol(s) implemented for all identified performance standard non-conformances?	☑ Yes	☐ No[1]
D	Does the laboratory report comply with all the reporting requirements specified in CAM VII A, Quality Assurance and Quality Control Guidlines for the Acquisition and Reporting of Analytical Data?	☑ Yes	☐ No[1]
E a	VPH, EPH, and APH Methods only: Was each method conducted without significant modification(s)? (Refer to the individual method(s) for a list of significant modifications).	☐ Yes	☐ No[1]
E b	APH and TO-15 Methods only: Was the complete analyte list reported for each method?	☐ Yes	☐ No[1]
F	Were all applicable CAM protocol QC and performance standard non-conformances identified and evaluated in a laboratory narrative (including all No responses to Qestions A through E)?	☑ Yes	☐ No[1]
	A response to questions G, H and I below is required for "Presumptive Certainty" status		
G	Were the reporting limits at or below all CAM reporting limits specified in the selected CAM protocol(s)?	☑ Yes	☐ No[1]
	<u>Data User Note:</u> Data that achieve "Presumptive Certainty" status may not necessarily meet the data usability and representativeness requirements described in 310 CMR 40. 1056 (2)(k) and WSC-07-350.		
H	Were all QC perfomance standards specified in the CAM protocol(s) achieved?	☑ Yes	☐ No[1]
I	Were results reported for the complete analyte list specified in the selected CAM protocol(s)?	☑ Yes	☐ No[1]

[1] *All Negative responses must be addressed in an attached Environmental Laboratory case narrative.*

I, the undersigned, attest under the pains and penalties of perjury that, based upon my personal inquiry of those responsible for obtaining the information, the material contained in this analytical report is, to the best of my knowledge and belief, accurate and complete.

Signature: Lisa Worthington Position: Technical Representative

Printed Name: Lisa A. Worthington Date: 10/26/20

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

October 21, 2020

Bryan Massa
Horsley Witten Group
90 Route 6A Unit #1
Sandwich, MA 02563

Project Location: Hyannis, MA
Client Job Number:
Project Number: 20102
Laboratory Work Order Number: 20J0491

Enclosed are results of analyses for samples received by the laboratory on October 8, 2020. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Raymond J. McCarthy
Project Manager

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Horsley Witten Group
90 Route 6A Unit #1
Sandwich, MA 02563
ATTN: Bryan Massa

REPORT DATE: 10/21/2020

PURCHASE ORDER NUMBER:

PROJECT NUMBER: 20102

ANALYTICAL SUMMARY

WORK ORDER NUMBER: 20J0491

The results of analyses performed on the following samples submitted to the CON-TEST Analytical Laboratory are found in this report.

PROJECT LOCATION: Hyannis, MA

FIELD SAMPLE #	LAB ID:	MATRIX	SAMPLE DESCRIPTION	TEST	SUB LAB
HW-L(s)	20J0491-01	Ground Water		SOP 434-PFAAS	
				SW-846 8270D-E	
HW-L(m)	20J0491-02	Ground Water		SOP 434-PFAAS	
				SW-846 8270D-E	
HW-L(d)	20J0491-03	Ground Water		SOP 434-PFAAS	

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

CASE NARRATIVE SUMMARY

All reported results are within defined laboratory quality control objectives unless listed below or otherwise qualified in this report.

SOP 434-PFAAS

Qualifications:

S-26

Surrogate outside of control limits.

Analyte & Samples(s) Qualified:

13C-PFDA
B268850-BS1

The results of analyses reported only relate to samples submitted to the Con-Test Analytical Laboratory for testing.
I certify that the analyses listed above, unless specifically listed as subcontracted, if any, were performed under my direction according to the approved methodologies listed in this document, and that based upon my inquiry of those individuals immediately responsible for obtaining the information, the material contained in this report is, to the best of my knowledge and belief, accurate and complete.

Lisa A. Worthington
Technical Representative

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Hyannis, MA | Sample Description: | Work Order: 20J0491

Date Received: 10/8/2020

Field Sample #: HW-L(s) | Sampled: 10/7/2020 12:45

Sample ID: 20J0491-01

Sample Matrix: Ground Water

1,4-Dioxane by isotope dilution GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
1,4-Dioxane	ND	0.20	µg/L	1		SW-846 8270D-E	10/9/20	10/13/20 16:28	CLA

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
1,4-Dioxane-d8	29.1	15-110		10/13/20 16:28

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Hyannis, MA | Sample Description: | Work Order: 20J0491

Date Received: 10/8/2020

Field Sample #: HW-L(s) | Sampled: 10/7/2020 12:45

Sample ID: 20J0491-01

Sample Matrix: Ground Water

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	ND	2.0	0.64	ng/L	1	U	SOP 434-PFAAS	10/16/20	10/21/20 8:36	JFC
Perfluorobutanesulfonic acid (PFBS)	ND	2.0	0.50	ng/L	1	U	SOP 434-PFAAS	10/16/20	10/21/20 8:36	JFC
Perfluoropentanoic acid (PFPeA)	ND	2.0	0.42	ng/L	1	U	SOP 434-PFAAS	10/16/20	10/21/20 8:36	JFC
Perfluorohexanoic acid (PFHxA)	ND	2.0	0.51	ng/L	1	U	SOP 434-PFAAS	10/16/20	10/21/20 8:36	JFC
Perfluorohexanesulfonic acid (PFHxS)	1.3	2.0	0.77	ng/L	1		SOP 434-PFAAS	10/16/20	10/21/20 8:36	JFC
Perfluoroheptanoic acid (PFHpA)	ND	2.0	0.53	ng/L	1	U	SOP 434-PFAAS	10/16/20	10/21/20 8:36	JFC
Perfluoroheptanesulfonic acid (PFHpS)	ND	2.0	1.0	ng/L	1	U	SOP 434-PFAAS	10/16/20	10/21/20 8:36	JFC
Perfluorooctanoic acid (PFOA)	ND	2.0	0.71	ng/L	1	U	SOP 434-PFAAS	10/16/20	10/21/20 8:36	JFC
Perfluorooctanesulfonic acid (PFOS)	1.4	2.0	0.68	ng/L	1		SOP 434-PFAAS	10/16/20	10/21/20 8:36	JFC
Perfluorooctanesulfonamide (FOSA)	ND	2.0	0.83	ng/L	1	U	SOP 434-PFAAS	10/16/20	10/21/20 8:36	JFC
6:2 Fluorotelomersulfonic acid (6:2FTS A)	ND	2.0	0.39	ng/L	1	U	SOP 434-PFAAS	10/16/20	10/21/20 8:36	JFC
Perfluorononanoic acid (PFNA)	ND	2.0	0.63	ng/L	1	U	SOP 434-PFAAS	10/16/20	10/21/20 8:36	JFC
Perfluorodecanoic acid (PFDA)	ND	2.0	0.62	ng/L	1	U	SOP 434-PFAAS	10/16/20	10/21/20 8:36	JFC
Perfluorodecanesulfonic acid (PFDS)	ND	2.0	0.51	ng/L	1	U	SOP 434-PFAAS	10/16/20	10/21/20 8:36	JFC
N-EtFOSAA	ND	2.0	0.70	ng/L	1	U	SOP 434-PFAAS	10/16/20	10/21/20 8:36	JFC
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	2.0	1.1	ng/L	1	U	SOP 434-PFAAS	10/16/20	10/21/20 8:36	JFC
Perfluoroundecanoic acid (PFUnA)	ND	2.0	0.49	ng/L	1	U	SOP 434-PFAAS	10/16/20	10/21/20 8:36	JFC
N-MeFOSAA	ND	2.0	0.62	ng/L	1	U	SOP 434-PFAAS	10/16/20	10/21/20 8:36	JFC
Perfluorododecanoic acid (PFDoA)	ND	2.0	0.50	ng/L	1	U	SOP 434-PFAAS	10/16/20	10/21/20 8:36	JFC
Perfluorotridecanoic acid (PFTrDA)	ND	2.0	0.67	ng/L	1	U	SOP 434-PFAAS	10/16/20	10/21/20 8:36	JFC
Perfluorotetradecanoic acid (PFTA)	ND	2.0	0.50	ng/L	1	U	SOP 434-PFAAS	10/16/20	10/21/20 8:36	JFC

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
13C-PFHxA	86.6	70-130		10/21/20 8:36
13C-PFDA	83.3	70-130		10/21/20 8:36
d5-NEtFOSAA	78.5	70-130		10/21/20 8:36

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Hyannis, MA | Sample Description: | Work Order: 20J0491

Date Received: 10/8/2020

Field Sample #: HW-L(m) | Sampled: 10/7/2020 11:25

Sample ID: 20J0491-02

Sample Matrix: Ground Water

1,4-Dioxane by isotope dilution GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
1,4-Dioxane	ND	0.20	µg/L	1		SW-846 8270D-E	10/9/20	10/13/20 16:48	CLA

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
1,4-Dioxane-d8	29.4	15-110		10/13/20 16:48

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Hyannis, MA | Sample Description: | Work Order: 20J0491

Date Received: 10/8/2020

Field Sample #: HW-L(m) | Sampled: 10/7/2020 11:25

Sample ID: 20J0491-02

Sample Matrix: Ground Water

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	7.1	2.0	0.64	ng/L	1		SOP 434-PFAAS	10/16/20	10/21/20 8:58	JFC
Perfluorobutanesulfonic acid (PFBS)	0.75	2.0	0.50	ng/L	1		SOP 434-PFAAS	10/16/20	10/21/20 8:58	JFC
Perfluoropentanoic acid (PFPeA)	27	2.0	0.42	ng/L	1		SOP 434-PFAAS	10/16/20	10/21/20 8:58	JFC
Perfluorohexanoic acid (PFHxA)	15	2.0	0.51	ng/L	1		SOP 434-PFAAS	10/16/20	10/21/20 8:58	JFC
Perfluorohexanesulfonic acid (PFHxS)	23	2.0	0.77	ng/L	1		SOP 434-PFAAS	10/16/20	10/21/20 8:58	JFC
Perfluoroheptanoic acid (PFHpA)	6.4	2.0	0.53	ng/L	1		SOP 434-PFAAS	10/16/20	10/21/20 8:58	JFC
Perfluoroheptanesulfonic acid (PFHpS)	ND	2.0	1.0	ng/L	1	U	SOP 434-PFAAS	10/16/20	10/21/20 8:58	JFC
Perfluorooctanoic acid (PFOA)	10	2.0	0.71	ng/L	1		SOP 434-PFAAS	10/16/20	10/21/20 8:58	JFC
Perfluorooctanesulfonic acid (PFOS)	70	2.0	0.68	ng/L	1		SOP 434-PFAAS	10/16/20	10/21/20 8:58	JFC
Perfluorooctanesulfonamide (FOSA)	ND	2.0	0.83	ng/L	1	U	SOP 434-PFAAS	10/16/20	10/21/20 8:58	JFC
6:2 Fluorotelomersulfonic acid (6:2FTS A)	22	2.0	0.39	ng/L	1		SOP 434-PFAAS	10/16/20	10/21/20 8:58	JFC
Perfluorononanoic acid (PFNA)	2.5	2.0	0.63	ng/L	1		SOP 434-PFAAS	10/16/20	10/21/20 8:58	JFC
Perfluorodecanoic acid (PFDA)	ND	2.0	0.62	ng/L	1	U	SOP 434-PFAAS	10/16/20	10/21/20 8:58	JFC
Perfluorodecanesulfonic acid (PFDS)	ND	2.0	0.51	ng/L	1	U	SOP 434-PFAAS	10/16/20	10/21/20 8:58	JFC
N-EtFOSAA	ND	2.0	0.70	ng/L	1	U	SOP 434-PFAAS	10/16/20	10/21/20 8:58	JFC
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	2.0	1.1	ng/L	1	U	SOP 434-PFAAS	10/16/20	10/21/20 8:58	JFC
Perfluoroundecanoic acid (PFUnA)	ND	2.0	0.49	ng/L	1	U	SOP 434-PFAAS	10/16/20	10/21/20 8:58	JFC
N-MeFOSAA	ND	2.0	0.62	ng/L	1	U	SOP 434-PFAAS	10/16/20	10/21/20 8:58	JFC
Perfluorododecanoic acid (PFDoA)	ND	2.0	0.50	ng/L	1	U	SOP 434-PFAAS	10/16/20	10/21/20 8:58	JFC
Perfluorotridecanoic acid (PFTrDA)	ND	2.0	0.67	ng/L	1	U	SOP 434-PFAAS	10/16/20	10/21/20 8:58	JFC
Perfluorotetradecanoic acid (PFTA)	ND	2.0	0.50	ng/L	1	U	SOP 434-PFAAS	10/16/20	10/21/20 8:58	JFC

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
13C-PFHxA	93.9	70-130		10/21/20 8:58
13C-PFDA	97.3	70-130		10/21/20 8:58
d5-NEtFOSAA	93.7	70-130		10/21/20 8:58

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Hyannis, MA | Sample Description: | Work Order: 20J0491

Date Received: 10/8/2020

Field Sample #: HW-L(d) | Sampled: 10/7/2020 13:10

Sample ID: 20J0491-03

Sample Matrix: Ground Water

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	5.0	2.0	0.64	ng/L	1		SOP 434-PFAAS	10/16/20	10/21/20 9:19	JFC
Perfluorobutanesulfonic acid (PFBS)	2.1	2.0	0.50	ng/L	1		SOP 434-PFAAS	10/16/20	10/21/20 9:19	JFC
Perfluoropentanoic acid (PFPeA)	18	2.0	0.42	ng/L	1		SOP 434-PFAAS	10/16/20	10/21/20 9:19	JFC
Perfluorohexanoic acid (PFHxA)	15	2.0	0.51	ng/L	1		SOP 434-PFAAS	10/16/20	10/21/20 9:19	JFC
Perfluorohexanesulfonic acid (PFHxS)	15	2.0	0.77	ng/L	1		SOP 434-PFAAS	10/16/20	10/21/20 9:19	JFC
Perfluoroheptanoic acid (PFHpA)	6.5	2.0	0.53	ng/L	1		SOP 434-PFAAS	10/16/20	10/21/20 9:19	JFC
Perfluoroheptanesulfonic acid (PFHpS)	ND	2.0	1.0	ng/L	1	U	SOP 434-PFAAS	10/16/20	10/21/20 9:19	JFC
Perfluorooctanoic acid (PFOA)	18	2.0	0.71	ng/L	1		SOP 434-PFAAS	10/16/20	10/21/20 9:19	JFC
Perfluorooctanesulfonic acid (PFOS)	39	2.0	0.68	ng/L	1		SOP 434-PFAAS	10/16/20	10/21/20 9:19	JFC
Perfluorooctanesulfonamide (FOSA)	ND	2.0	0.83	ng/L	1	U	SOP 434-PFAAS	10/16/20	10/21/20 9:19	JFC
6:2 Fluorotelomersulfonic acid (6:2FTS A)	0.78	2.0	0.39	ng/L	1		SOP 434-PFAAS	10/16/20	10/21/20 9:19	JFC
Perfluorononanoic acid (PFNA)	2.2	2.0	0.63	ng/L	1		SOP 434-PFAAS	10/16/20	10/21/20 9:19	JFC
Perfluorodecanoic acid (PFDA)	1.9	2.0	0.62	ng/L	1		SOP 434-PFAAS	10/16/20	10/21/20 9:19	JFC
Perfluorodecanesulfonic acid (PFDS)	ND	2.0	0.51	ng/L	1	U	SOP 434-PFAAS	10/16/20	10/21/20 9:19	JFC
N-EtFOSAA	ND	2.0	0.70	ng/L	1	U	SOP 434-PFAAS	10/16/20	10/21/20 9:19	JFC
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	2.0	1.1	ng/L	1	U	SOP 434-PFAAS	10/16/20	10/21/20 9:19	JFC
Perfluoroundecanoic acid (PFUnA)	ND	2.0	0.49	ng/L	1	U	SOP 434-PFAAS	10/16/20	10/21/20 9:19	JFC
N-MeFOSAA	ND	2.0	0.62	ng/L	1	U	SOP 434-PFAAS	10/16/20	10/21/20 9:19	JFC
Perfluorododecanoic acid (PFDoA)	ND	2.0	0.50	ng/L	1	U	SOP 434-PFAAS	10/16/20	10/21/20 9:19	JFC
Perfluorotridecanoic acid (PFTrDA)	ND	2.0	0.67	ng/L	1	U	SOP 434-PFAAS	10/16/20	10/21/20 9:19	JFC
Perfluorotetradecanoic acid (PFTA)	ND	2.0	0.50	ng/L	1	U	SOP 434-PFAAS	10/16/20	10/21/20 9:19	JFC

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
13C-PFHxA	92.6	70-130		10/21/20 9:19
13C-PFDA	95.1	70-130		10/21/20 9:19
d5-NEtFOSAA	91.8	70-130		10/21/20 9:19

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Sample Extraction Data

Prep Method: SOP 434-PFAAS **Analytical Method: SOP 434-PFAAS**

Lab Number [Field ID]	Batch	Initial [mL]	Final [mL]	Date
20J0491-01 [HW-L(s)]	B268850	250	1.00	10/16/20
20J0491-02 [HW-L(m)]	B268850	250	1.00	10/16/20
20J0491-03 [HW-L(d)]	B268850	250	1.00	10/16/20

Prep Method: SW-846 3510C **Analytical Method: SW-846 8270D-E**

Lab Number [Field ID]	Batch	Initial [mL]	Final [mL]	Date
20J0491-01 [HW-L(s)]	B268322	1000	1.00	10/09/20
20J0491-02 [HW-L(m)]	B268322	1010	1.00	10/09/20

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QUALITY CONTROL

1,4-Dioxane by isotope dilution GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B268322 - SW-846 3510C										
Blank (B268322-BLK1)				Prepared: 10/09/20 Analyzed: 10/13/20						
1,4-Dioxane	ND	0.20	µg/L							
Surrogate: 1,4-Dioxane-d8	*1.77*		µg/L	10.0		17.7	15-110			
LCS (B268322-BS1)				Prepared: 10/09/20 Analyzed: 10/13/20						
1,4-Dioxane	10.2	0.20	µg/L	10.0		102	40-140			
Surrogate: 1,4-Dioxane-d8	*2.12*		µg/L	10.0		21.2	15-110			
LCS Dup (B268322-BSD1)				Prepared: 10/09/20 Analyzed: 10/13/20						
1,4-Dioxane	10.5	0.20	µg/L	10.0		105	40-140	2.64	30	
Surrogate: 1,4-Dioxane-d8	*2.00*		µg/L	10.0		20.0	15-110			

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QUALITY CONTROL

Semivolatile Organic Compounds by - LC/MS-MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC		%REC Limits	RPD	RPD Limit	Notes
Batch B268850 - SOP 434-PFAAS											
Blank (B268850-BLK1)				Prepared: 10/16/20 Analyzed: 10/21/20							
Perfluorobutanoic acid (PFBA)	ND	2.0	ng/L								U
Perfluorobutanesulfonic acid (PFBS)	ND	2.0	ng/L								U
Perfluoropentanoic acid (PFPeA)	ND	2.0	ng/L								U
Perfluorohexanoic acid (PFHxA)	ND	2.0	ng/L								U
Perfluorohexanesulfonic acid (PFHxS)	ND	2.0	ng/L								U
Perfluoroheptanoic acid (PFHpA)	ND	2.0	ng/L								U
Perfluoroheptanesulfonic acid (PFHpS)	ND	2.0	ng/L								U
Perfluorooctanoic acid (PFOA)	ND	2.0	ng/L								U
Perfluorooctanesulfonic acid (PFOS)	ND	2.0	ng/L								U
Perfluorooctanesulfonamide (FOSA)	ND	2.0	ng/L								U
6:2 Fluorotelomersulfonic acid (6:2FTS A)	ND	2.0	ng/L								U
Perfluorononanoic acid (PFNA)	ND	2.0	ng/L								U
Perfluorodecanoic acid (PFDA)	ND	2.0	ng/L								U
Perfluorodecanesulfonic acid (PFDS)	ND	2.0	ng/L								U
N-EtFOSAA	ND	2.0	ng/L								U
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	2.0	ng/L								U
Perfluoroundecanoic acid (PFUnA)	ND	2.0	ng/L								U
N-MeFOSAA	ND	2.0	ng/L								U
Perfluorododecanoic acid (PFDoA)	ND	2.0	ng/L								U
Perfluorotridecanoic acid (PFTrDA)	ND	2.0	ng/L								U
Perfluorotetradecanoic acid (PFTA)	ND	2.0	ng/L								U
Surrogate: 13C-PFHxA	*34.6*		ng/L	40.0		86.4		70-130			
Surrogate: 13C-PFDA	*34.3*		ng/L	40.0		85.7		70-130			
Surrogate: d5-NEtFOSAA	*142*		ng/L	160		88.8		70-130			
LCS (B268850-BS1)				Prepared: 10/16/20 Analyzed: 10/21/20							
Perfluorobutanoic acid (PFBA)	7.73	2.0	ng/L	10.0		77.3		70-130			
Perfluorobutanesulfonic acid (PFBS)	8.90	2.0	ng/L	8.85		101		70-130			
Perfluoropentanoic acid (PFPeA)	10.6	2.0	ng/L	10.0		106		70-130			
Perfluorohexanoic acid (PFHxA)	9.40	2.0	ng/L	10.0		94.0		70-130			
Perfluorohexanesulfonic acid (PFHxS)	8.63	2.0	ng/L	9.10		94.8		70-130			
Perfluoroheptanoic acid (PFHpA)	9.58	2.0	ng/L	10.0		95.8		70-130			
Perfluoroheptanesulfonic acid (PFHpS)	8.67	2.0	ng/L	9.50		91.2		70-130			
Perfluorooctanoic acid (PFOA)	9.05	2.0	ng/L	10.0		90.5		70-130			
Perfluorooctanesulfonic acid (PFOS)	8.19	2.0	ng/L	9.25		88.5		70-130			
Perfluorooctanesulfonamide (FOSA)	7.77	2.0	ng/L	10.0		77.7		70-130			
6:2 Fluorotelomersulfonic acid (6:2FTS A)	12.1	2.0	ng/L	9.50		127		70-130			
Perfluorononanoic acid (PFNA)	8.68	2.0	ng/L	10.0		86.8		70-130			
Perfluorodecanoic acid (PFDA)	8.45	2.0	ng/L	10.0		84.5		70-130			
Perfluorodecanesulfonic acid (PFDS)	8.63	2.0	ng/L	9.65		89.5		70-130			
N-EtFOSAA	9.80	2.0	ng/L	10.0		98.0		70-130			
8:2 Fluorotelomersulfonic acid (8:2FTS A)	10.6	2.0	ng/L	9.60		111		70-130			
Perfluoroundecanoic acid (PFUnA)	8.46	2.0	ng/L	10.0		84.6		70-130			
N-MeFOSAA	10.6	2.0	ng/L	10.0		106		70-130			
Perfluorododecanoic acid (PFDoA)	8.32	2.0	ng/L	10.0		83.2		70-130			
Perfluorotridecanoic acid (PFTrDA)	8.21	2.0	ng/L	10.0		82.1		70-130			
Perfluorotetradecanoic acid (PFTA)	7.06	2.0	ng/L	10.0		70.6		70-130			
Surrogate: 13C-PFHxA	*33.3*		ng/L	40.0		83.4		70-130			
Surrogate: 13C-PFDA	*27.2*		ng/L	40.0		**67.9**	*	70-130			S-26
Surrogate: d5-NEtFOSAA	*119*		ng/L	160		74.3		70-130			

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FLAG/QUALIFIER SUMMARY

*	QC result is outside of established limits.
†	Wide recovery limits established for difficult compound.
‡	Wide RPD limits established for difficult compound.
#	Data exceeded client recommended or regulatory level
ND	Not Detected
RL	Reporting Limit is at the level of quantitation (LOQ)
DL	Detection Limit is the lower limit of detection determined by the MDL study
MCL	Maximum Contaminant Level
	Percent recoveries and relative percent differences (RPDs) are determined by the software using values in the calculation which have not been rounded.
	No results have been blank subtracted unless specified in the case narrative section.
S-26	Surrogate outside of control limits.
U	Analyte included in the analysis, but not detected

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CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
SOP 434-PFAAS in Water	
Perfluorobutanoic acid (PFBA)	NH-P
Perfluorobutanesulfonic acid (PFBS)	NH-P
Perfluoropentanoic acid (PFPeA)	NH-P
Perfluorohexanoic acid (PFHxA)	NH-P
Perfluorohexanesulfonic acid (PFHxS)	NH-P
Perfluoroheptanoic acid (PFHpA)	NH-P
Perfluorooctanoic acid (PFOA)	NH-P
Perfluorooctanesulfonic acid (PFOS)	NH-P
6:2 Fluorotelomersulfonic acid (6:2FTS A)	NH-P
Perfluorononanoic acid (PFNA)	NH-P
Perfluorodecanoic acid (PFDA)	NH-P
N-EtFOSAA	NH-P
8:2 Fluorotelomersulfonic acid (8:2FTS A)	NH-P
Perfluoroundecanoic acid (PFUnA)	NH-P
N-MeFOSAA	NH-P
Perfluorododecanoic acid (PFDoA)	NH-P
Perfluorotridecanoic acid (PFTrDA)	NH-P
Perfluorotetradecanoic acid (PFTA)	NH-P
SW-846 8270D-E in Water	
1,4-Dioxane	NY

The CON-TEST Environmental Laboratory operates under the following certifications and accreditations:

Code	Description	Number	Expires
AIHA	AIHA-LAP, LLC - ISO17025:2017	100033	03/1/2022
MA	Massachusetts DEP	M-MA100	06/30/2021
CT	Connecticut Department of Publilc Health	PH-0567	09/30/2021
NY	New York State Department of Health	10899 NELAP	04/1/2021
NH-S	New Hampshire Environmental Lab	2516 NELAP	02/5/2021
RI	Rhode Island Department of Health	LAO00112	12/30/2020
NC	North Carolina Div. of Water Quality	652	12/31/2020
NJ	New Jersey DEP	MA007 NELAP	06/30/2021
FL	Florida Department of Health	E871027 NELAP	06/30/2021
VT	Vermont Department of Health Lead Laboratory	LL015036	07/30/2021
ME	State of Maine	2011028	06/9/2021
VA	Commonwealth of Virginia	460217	12/14/2020
NH-P	New Hampshire Environmental Lab	2557 NELAP	09/6/2021
VT-DW	Vermont Department of Health Drinking Water	VT-255716	06/12/2021
NC-DW	North Carolina Department of Health	25703	07/31/2021
PA	Commonwealth of Pennsylvania DEP	68-05812	06/30/2021
MI	Dept. of Env, Great Lakes, and Energy	9100	09/6/2021

2050491

con-test ANALYTICAL LABORATORY

Phone: 413-525-2332
Fax: 413-525-6405
Email: info@contestlabs.com

http://www.contestlabs.com

CHAIN OF CUSTODY RECORD

39 Spruce Street
East Longmeadow, MA 01028

Doc # 381 Rev 2_06262019

Page 1 of 1

Company Name: Horsley Witten Group
Address: 90 Rte 6A Sandwich MA 02563
Phone: (508) 833-6600
Project Name: Barnstable Municipal Airport
Project Location: Hyannis, MA
Project Number: 20102
Project Manager: Bryan Massa
Con-Test Quote Name/Number:
Invoice Recipient:
Sampled By: HW - SB + MD

Requested Turnaround Time			
7-Day	✓	10-Day	
PFAS 10-Day (std)		Due Date:	

Rush-Approval Required			
1-Day		3-Day	
2-Day		4-Day	

Dissolved Metals Samples	
	Field Filtered
	Lab to Filter

Orthophosphate Samples	
	Field Filtered
	Lab to Filter

Data Delivery			
Format:	PDF	✓	EXCEL ✓
Other:			
CLP Like Data Pkg Required:			
Email To:	bmassa@horsleywitten.com		
Fax To #:			

ANALYSIS REQUESTED

Con-Test Work Order#	Client Sample ID / Description	Beginning Date/Time	Ending Date/Time	COMP/GRAB	[1] Matrix Code	Conc Code	VIALS	GLASS	PLASTIC	BACTERIA	ENCORE	PFAS - All	1,4-Dioxane
1	HW-L(s)	10/7/20	12:45	Grab	GW			✓	✓			✓	✓
2	HW-L(m)	10/7/20	11:25	Grab	GW			✓	✓			✓	✓
3	HW-L(d)	10/7/20	13:10	Grab	GW				✓			✓	

[2] Preservation Code

Courier Use Only

Total Number Of:

VIALS
GLASS 3
PLASTIC 6
BACTERIA
ENCORE

Glassware in the fridge? (Y) / N

Glassware in freezer? Y / N

Prepackaged Cooler? Y / N

*Contest is not responsible for missing samples from prepacked coolers

[1] Matrix Codes:
GW = Ground Water
WW = Waste Water
DW = Drinking Water
A = Air
S = Soil
SL = Sludge
SOL = Solid
O = Other (please define)

[2] Preservation Codes:
I = Iced
H = HCL
M = Methanol
N = Nitric Acid
S = Sulfuric Acid
B = Sodium Bisulfate
X = Sodium Hydroxide
T = Sodium Thiosulfate
O = Other (please define)

Relinquished by: (signature)	Date/Time:	Received by: (signature)	Date/Time:
M. Wilson	10/8/20 1205	Paul Chartrand	10-8-20 1205
Paul Chartrand	10-8-20 1605		
	10/8/20 1825		
	10/8/20 1945		
	10/8/20 1945		

Client Comments:

Detection Limit Requirements
MA: GW-1
CT:
Other:

Special Requirements
✓ MA MCP Required
MCP Certification Form Required
CT RCP Required
RCP Certification Form Required
MA State DW Required
PWSID #

Please use the following codes to indicate possible sample concentration within the Conc Code column above:
H - High; M - Medium; L - Low; C - Clean; U - Unknown

NELAC and AIHA-LAP, LLC Accredited

Project Entity
Government ☐ Municipality ☐ MWRA ☐ WRTA ☐
Federal ☐ 21 J ☐ School ☐
City ☐ Brownfield ☐ MBTA ☐

Other
☐ Chromatogram
☐ AIHA-LAP,LLC

PCB ONLY
☐ Soxhlet
☐ Non Soxhlet

Comments:

Disclaimer: Con-Test Labs is not responsible for any omitted information on the Chain of Custody. Th Chain of Custody is a legal document that must be complete and accurate and is used to determine wh analyses the laboratory will perform. Any missing information is not the laboratory's responsibility. Co Test values your partnership on each project and will try to assist with missing information, but will not held accountable.

Table of Contents

I Have Not Confirmed Sample Container Numbers With Lab Staff Before Relinquishing Over Samples_____

con-test® ANALYTICAL LABORATORY

Doc# 277 Rev 5 2017

Login Sample Receipt Checklist - (Rejection Criteria Listing - Using Acceptance Policy) Any False Statement will be brought to the attention of the Client - State True or False

Client Horsley Witten

Received By [illegible] Date 10/8/20 Time 1945

How were the samples received? In Cooler T No Cooler _____ On Ice T No Ice _____ Direct from Sampling _____ Ambient _____ Melted Ice _____

Were samples within Temperature? 2-6°C T By Gun # 4 Actual Temp - 2.5 By Blank # _____ Actual Temp - _____

Was Custody Seal Intact? n/a Were Samples Tampered with? n/a

Was COC Relinquished ? T Does Chain Agree With Samples? T

Are there broken/leaking/loose caps on any samples? F

Is COC in ink/ Legible? T Were samples received within holding time? T

Did COC include all pertinent Information? Client T Analysis T Sampler Name T Project T ID's T Collection Dates/Times T

Are Sample labels filled out and legible? T

Are there Lab to Filters? F Who was notified? _____

Are there Rushes? F Who was notified? _____

Are there Short Holds? F Who was notified? _____

Is there enough Volume? T

Is there Headspace where applicable? n/a MS/MSD? F

Proper Media/Containers Used? T Is splitting samples required? F

Were trip blanks received? F On COC? F

Do all samples have the proper pH? Acid n/a Base n/a

Vials	#	Containers:	#		#		#
Unp-		1 Liter Amb.		1 Liter Plastic		16 oz Amb.	
HCL-		500 mL Amb.		500 mL Plastic		8oz Amb/Clear	
Meoh-		250 mL Amb.		250 mL Plastic	Co	4oz Amb/Clear	
Bisulfate-		Flashpoint		Col./Bacteria		2oz Amb/Clear	
DI-		Other Glass		Other Plastic		Encore	
Thiosulfate-		SOC Kit		Plastic Bag		Frozen:	
Sulfuric-		Perchlorate		Ziplock			

Unused Media

Vials	#	Containers:	#		#		#
Unp-		1 Liter Amb.		1 Liter Plastic		16 oz Amb.	
HCL-		500 mL Amb.		500 mL Plastic		8oz Amb/Clear	
Meoh-		250 mL Amb.		250 mL Plastic		4oz Amb/Clear	
Bisulfate-		Col./Bacteria		Flashpoint		2oz Amb/Clear	
DI-		Other Plastic		Other Glass		Encore	
Thiosulfate-		SOC Kit		Plastic Bag		Frozen:	
Sulfuric-		Perchlorate		Ziplock			

Comments:

MADEP MCP Analytical Method Report Certification Form

Laboratory Name: Con-Test Analytical Laboratory	Project #: 20J0491
Project Location: Hyannis, MA	RTN:

This Form provides certifications for the following data set: [list Laboratory Sample ID Number(s)]

20J0491-01 thru 20J0491-03

Matrices: Water

CAM Protocol (check all that below)

8260 VOC CAM II A ( )	7470/7471 Hg CAM IIIB ( )	MassDEP VPH CAM IV A ( )	8082 PCB CAM V A ( )	9014 Total Cyanide/PAC CAM VI A ( )	6860 Perchlorate CAM VIII B ( )
8270 SVOC CAM II B (X)	7010 Metals CAM III C ( )	MassDEP VPH CAM IV C ( )	8081 Pesticides CAM V B ( )	7196 Hex Cr CAM VI B ( )	MassDEP APH CAM IX A ( )
6010 Metals CAM III A ( )	6020 Metals CAM III D ( )	MassDEP EPH CAM IV B ( )	8151 Herbicides CAM V C ( )	8330 Explosives CAM VIII A ( )	TO-15 VOC CAM IX B ( )

Affirmative response to Questions A throughF is required for "Presumptive Certainty" status

A	Were all samples received in a condition consistent with those described on the Chain-of-Custody, properly preserved (including temperature) in the field or laboratory, and prepared/analyzed within method holding times?	☑ Yes	☐ No[1]
B	Were the analytical method(s) and all associated QC requirements specificed in the selected CAM protocol(s) followed?	☑ Yes	☐ No[1]
C	Were all required corrective actions and analytical response actions specified in the selected CAM protocol(s) implemented for all identified performance standard non-conformances?	☑ Yes	☐ No[1]
D	Does the laboratory report comply with all the reporting requirements specified in CAM VII A, Quality Assurance and Quality Control Guidlines for the Acquisition and Reporting of Analytical Data?	☑ Yes	☐ No[1]
E a	VPH, EPH, and APH Methods only: Was each method conducted without significant modification(s)? (Refer to the individual method(s) for a list of significant modifications).	☐ Yes	☐ No[1]
E b	APH and TO-15 Methods only: Was the complete analyte list reported for each method?	☐ Yes	☐ No[1]
F	Were all applicable CAM protocol QC and performance standard non-conformances identified and evaluated in a laboratory narrative (including all No responses to Qestions A through E)?	☑ Yes	☐ No[1]

A response to questions G, H and I below is required for "Presumptive Certainty" status

G	Were the reporting limits at or below all CAM reporting limits specified in the selected CAM protocol(s)?	☑ Yes	☐ No[1]

***Data User Note:* Data that achieve "Presumptive Certainty" status may not necessarily meet the data usability and representativeness requirements described in 310 CMR 40. 1056 (2)(k) and WSC-07-350.**

H	Were all QC perfomance standards specified in the CAM protocol(s) achieved?	☑ Yes	☐ No[1]
I	Were results reported for the complete analyte list specified in the selected CAM protocol(s)?	☑ Yes	☐ No[1]

[1] *All Negative responses must be addressed in an attached Environmental Laboratory case narrative.*

I, the undersigned, attest under the pains and penalties of perjury that, based upon my personal inquiry of those responsible for obtaining the information, the material contained in this analytical report is, to the best of my knowledge and belief, accurate and complete.

Signature: Lisa Worthington Position: Technical Representative

Printed Name: Lisa A. Worthington Date: 10/21/20

ANALYTICAL REPORT

Lab Number:	L2041358
Client:	Horseley & Witten, Inc. Sextant Hill Office Park 90 Route 6A Sandwich, MA 02563
ATTN:	Brian Massa
Phone:	(508) 833-6600
Project Name:	BARNSTABLE AIRPORT
Project Number:	20102
Report Date:	10/14/20

The original project report/data package is held by Alpha Analytical. This report/data package is paginated and should be reproduced only in its entirety. Alpha Analytical holds no responsibility for results and/or data that are not consistent with the original.

Certifications & Approvals: MA (M-MA030), NH NELAP (2062), CT (PH-0141), DoD (L2474), FL (E87814), IL (200081), LA (85084), ME (MA00030), MD (350), NJ (MA015), NY (11627), NC (685), OH (CL106), PA (68-02089), RI (LAO00299), TX (T104704419), VT (VT-0015), VA (460194), WA (C954), US Army Corps of Engineers, USDA (Permit #P330-17-00150), USFWS (Permit #206964).

320 Forbes Boulevard, Mansfield, MA 02048-1806
508-822-9300 (Fax) 508-822-3288 800-624-9220 - www.alphalab.com

Project Name: BARNSTABLE AIRPORT
Project Number: 20102

Lab Number: L2041358
Report Date: 10/14/20

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L2041358-01	DL23(0-1)	SOIL	HYANNIS, MA	09/29/20 14:10	09/30/20
L2041358-02	A13(0-1)	SOIL	HYANNIS, MA	09/29/20 14:39	09/30/20
L2041358-03	A22(0-1)	SOIL	HYANNIS, MA	09/29/20 14:52	09/30/20
L2041358-04	A18(0-1)	SOIL	HYANNIS, MA	09/29/20 15:13	09/30/20
L2041358-05	DL15(0-1)	SOIL	HYANNIS, MA	09/30/20 11:22	09/30/20
L2041358-06	DL16(0-1)	SOIL	HYANNIS, MA	09/30/20 11:34	09/30/20

Project Name: BARNSTABLE AIRPORT **Lab Number:** L2041358

Project Number: 20102 **Report Date:** 10/14/20

MADEP MCP Response Action Analytical Report Certification

This form provides certifications for all samples performed by MCP methods. Please refer to the Sample Results and Container Information sections of this report for specification of MCP methods used for each analysis. The following questions pertain only to MCP Analytical Methods.

An affirmative response to questions A through F is required for "Presumptive Certainty" status		
A	Were all samples received in a condition consistent with those described on the Chain-of-Custody, properly preserved (including temperature) in the field or laboratory, and prepared/analyzed within method holding times?	YES
B	Were the analytical method(s) and all associated QC requirements specified in the selected CAM protocol(s) followed?	YES
C	Were all required corrective actions and analytical response actions specified in the selected CAM protocol(s) implemented for all identified performance standard non-conformances?	YES
D	Does the laboratory report comply with all the reporting requirements specified in CAM VII A, "Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data?"	YES
E a.	VPH, EPH, and APH Methods only: Was each method conducted without significant modification(s)? (Refer to the individual method(s) for a list of significant modifications).	N/A
E b.	APH and TO-15 Methods only: Was the complete analyte list reported for each method?	N/A
F	Were all applicable CAM protocol QC and performance standard non-conformances identified and evaluated in a laboratory narrative (including all "No" responses to Questions A through E)?	YES

A response to questions G, H and I is required for "Presumptive Certainty" status		
G	Were the reporting limits at or below all CAM reporting limits specified in the selected CAM protocol(s)?	YES
H	Were all QC performance standards specified in the CAM protocol(s) achieved?	YES
I	Were results reported for the complete analyte list specified in the selected CAM protocol(s)?	YES

For any questions answered "No", please refer to the case narrative section on the following page(s).

Please note that sample matrix information is located in the Sample Results section of this report.

Project Name:	BARNSTABLE AIRPORT	**Lab Number:**	L2041358
Project Number:	20102	**Report Date:**	10/14/20

Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet NELAP requirements for all NELAP accredited parameters unless otherwise noted in the following narrative. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively.

When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances, the specific failure is not narrated but noted in the associated QC Outlier Summary Report, located directly after the Case Narrative. QC information is also incorporated in the Data Usability Assessment table (Format 11) of our Data Merger tool, where it can be reviewed in conjunction with the sample result, associated regulatory criteria and any associated data usability implications.

Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

HOLD POLICY - For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Alpha Project Manager and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Project Management at 800-624-9220 with any questions.

Project Name:	BARNSTABLE AIRPORT	**Lab Number:**	L2041358
Project Number:	20102	**Report Date:**	10/14/20

Case Narrative (continued)

Report Submission

All non-detect (ND) or estimated concentrations (J-qualified) have been quantitated to the limit noted in the MDL column.

MCP Related Narratives

Report Submission

All MCP required questions were answered with affirmative responses; therefore, there are no relevant protocol-specific QC and/or performance standard non-conformances to report.

Non-MCP Related Narratives

Perfluorinated Alkyl Acids by Isotope Dilution

L2041358-02, -03, -04, and -06: Extracted Internal Standard recoveries were outside the acceptance criteria for individual analytes. Please refer to the surrogate section of the report for details.

L2041358-05RE: The sample was re-extracted within holding time due to QC failures in the original extraction. The results of the re-extraction are reported. The sample has elevated detection limits due to the limited sample volume utilized during extraction, as required by the sample matrix. The reporting limit was elevated for NMeFOSAAdue to low recovery of the extracted internal standard d3-NMeFOSAA. The low recovery was attributed to the sample matrix. Extracted Internal Standard recoveries were outside the acceptance criteria for individual analytes. Please refer to the surrogate section of the report for details.

The WG1418580-2/-3 LCS/LCSD RPD, associated with L2041358-01, -02, -03, -04 and -06, are above the acceptance criteria for n-methyl perfluorooctanesulfonamidoacetic acid (nmefosaa) (42%).

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature: Susan E O'Neil Susan O' Neil

Title: Technical Director/Representative Date: 10/14/20

QC OUTLIER SUMMARY REPORT

Project Name: BARNSTABLE AIRPORT
Project Number: 20102

Lab Number: L2041358
Report Date: 10/14/20

Method	Client ID (Native ID)	Lab ID	Parameter	QC Type	Recovery/RPD (%)	QC Limits (%)	Associated Samples	Data Quality Assessment
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab								
LCMSMS-ID	Batch QC	WG1418580-3	N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	LCSD	42	30	01-04,06	non-directional bias

ORGANICS

SEMIVOLATILES

Project Name: BARNSTABLE AIRPORT **Lab Number:** L2041358

Project Number: 20102 **Report Date:** 10/14/20

SAMPLE RESULTS

Lab ID: L2041358-01
Client ID: DL23(0-1)
Sample Location: HYANNIS, MA

Date Collected: 09/29/20 14:10
Date Received: 09/30/20
Field Prep: Not Specified

Sample Depth:
Matrix: Soil
Analytical Method: 134,LCMSMS-ID
Analytical Date: 10/09/20 02:28
Analyst: SG
Percent Solids: 96%

Extraction Method: ALPHA 23528
Extraction Date: 10/06/20 11:45

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						
Perfluorobutanoic Acid (PFBA)	0.480	J	ng/g	1.01	0.023	1
Perfluoropentanoic Acid (PFPeA)	0.841	J	ng/g	1.01	0.046	1
Perfluorobutanesulfonic Acid (PFBS)	ND		ng/g	1.01	0.039	1
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	ND		ng/g	1.01	0.065	1
Perfluorohexanoic Acid (PFHxA)	0.480	J	ng/g	1.01	0.053	1
Perfluoropentanesulfonic Acid (PFPeS)	ND		ng/g	1.01	0.084	1
Perfluoroheptanoic Acid (PFHpA)	0.240	J	ng/g	1.01	0.046	1
Perfluorohexanesulfonic Acid (PFHxS)	0.134	J	ng/g	1.01	0.061	1
Perfluorooctanoic Acid (PFOA)	0.471	J	ng/g	1.01	0.042	1
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND		ng/g	1.01	0.181	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		ng/g	1.01	0.138	1
Perfluorononanoic Acid (PFNA)	0.176	J	ng/g	1.01	0.076	1
Perfluorooctanesulfonic Acid (PFOS)	0.725	J	ng/g	1.01	0.131	1
Perfluorodecanoic Acid (PFDA)	0.266	J	ng/g	1.01	0.068	1
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND		ng/g	1.01	0.289	1
Perfluorononanesulfonic Acid (PFNS)	ND		ng/g	1.01	0.302	1
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND		ng/g	1.01	0.203	1
Perfluoroundecanoic Acid (PFUnA)	0.162	JF	ng/g	1.01	0.047	1
Perfluorodecanesulfonic Acid (PFDS)	ND		ng/g	1.01	0.154	1
Perfluorooctanesulfonamide (FOSA)	ND		ng/g	1.01	0.099	1
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND		ng/g	1.01	0.085	1
Perfluorododecanoic Acid (PFDoA)	0.078	JF	ng/g	1.01	0.071	1
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/g	1.01	0.206	1
Perfluorotetradecanoic Acid (PFTA)	ND		ng/g	1.01	0.055	1

Project Name: BARNSTABLE AIRPORT **Lab Number:** L2041358

Project Number: 20102 **Report Date:** 10/14/20

SAMPLE RESULTS

Lab ID: L2041358-01 Date Collected: 09/29/20 14:10

Client ID: DL23(0-1) Date Received: 09/30/20

Sample Location: HYANNIS, MA Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						

Surrogate (Extracted Internal Standard)	% Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	83		60-153
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	92		65-182
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	99		70-151
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	114		56-138
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	78		61-147
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	81		62-149
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	91		63-166
Perfluoro[13C8]Octanoic Acid (M8PFOA)	85		62-152
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	96		32-182
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	90		61-154
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	98		65-151
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	82		65-150
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	108		25-186
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	97		45-137
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	98		64-158
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	63		1-125
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	91		42-136
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	94		56-148
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	88		26-160

Project Name: BARNSTABLE AIRPORT **Lab Number:** L2041358

Project Number: 20102 **Report Date:** 10/14/20

SAMPLE RESULTS

Lab ID: L2041358-02
Client ID: A13(0-1)
Sample Location: HYANNIS, MA

Date Collected: 09/29/20 14:39
Date Received: 09/30/20
Field Prep: Not Specified

Sample Depth:
Matrix: Soil
Analytical Method: 134,LCMSMS-ID
Analytical Date: 10/09/20 02:45
Analyst: SG
Percent Solids: 98%

Extraction Method: ALPHA 23528
Extraction Date: 10/06/20 11:45

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						
Perfluorobutanoic Acid (PFBA)	0.279	J	ng/g	0.966	0.022	1
Perfluoropentanoic Acid (PFPeA)	0.614	J	ng/g	0.966	0.044	1
Perfluorobutanesulfonic Acid (PFBS)	ND		ng/g	0.966	0.038	1
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	ND		ng/g	0.966	0.062	1
Perfluorohexanoic Acid (PFHxA)	0.352	J	ng/g	0.966	0.051	1
Perfluoropentanesulfonic Acid (PFPeS)	ND		ng/g	0.966	0.081	1
Perfluoroheptanoic Acid (PFHpA)	0.396	J	ng/g	0.966	0.044	1
Perfluorohexanesulfonic Acid (PFHxS)	ND		ng/g	0.966	0.058	1
Perfluorooctanoic Acid (PFOA)	0.670	J	ng/g	0.966	0.040	1
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND		ng/g	0.966	0.173	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		ng/g	0.966	0.132	1
Perfluorononanoic Acid (PFNA)	1.19		ng/g	0.966	0.072	1
Perfluorooctanesulfonic Acid (PFOS)	1.32		ng/g	0.966	0.126	1
Perfluorodecanoic Acid (PFDA)	0.340	J	ng/g	0.966	0.065	1
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND		ng/g	0.966	0.277	1
Perfluorononanesulfonic Acid (PFNS)	ND		ng/g	0.966	0.289	1
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND		ng/g	0.966	0.194	1
Perfluoroundecanoic Acid (PFUnA)	0.082	J	ng/g	0.966	0.045	1
Perfluorodecanesulfonic Acid (PFDS)	ND		ng/g	0.966	0.148	1
Perfluorooctanesulfonamide (FOSA)	ND		ng/g	0.966	0.095	1
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND		ng/g	0.966	0.082	1
Perfluorododecanoic Acid (PFDoA)	ND		ng/g	0.966	0.068	1
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/g	0.966	0.197	1
Perfluorotetradecanoic Acid (PFTA)	ND		ng/g	0.966	0.052	1

Project Name: BARNSTABLE AIRPORT **Lab Number:** L2041358

Project Number: 20102 **Report Date:** 10/14/20

SAMPLE RESULTS

Lab ID: L2041358-02 Date Collected: 09/29/20 14:39

Client ID: A13(0-1) Date Received: 09/30/20

Sample Location: HYANNIS, MA Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor

Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab

Surrogate (Extracted Internal Standard)	% Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	101		60-153
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	114		65-182
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	119		70-151
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	123		56-138
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	101		61-147
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	109		62-149
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	123		63-166
Perfluoro[13C8]Octanoic Acid (M8PFOA)	108		62-152
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	106		32-182
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	115		61-154
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	118		65-151
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	111		65-150
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	117		25-186
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	**27**	Q	45-137
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	130		64-158
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	17		1-125
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	**32**	Q	42-136
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	126		56-148
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	117		26-160

Project Name: BARNSTABLE AIRPORT **Lab Number:** L2041358

Project Number: 20102 **Report Date:** 10/14/20

SAMPLE RESULTS

Lab ID: L2041358-03
Client ID: A22(0-1)
Sample Location: HYANNIS, MA

Date Collected: 09/29/20 14:52
Date Received: 09/30/20
Field Prep: Not Specified

Sample Depth:
Matrix: Soil
Analytical Method: 134,LCMSMS-ID
Analytical Date: 10/09/20 03:01
Analyst: SG
Percent Solids: 97%

Extraction Method: ALPHA 23528
Extraction Date: 10/06/20 11:45

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						
Perfluorobutanoic Acid (PFBA)	0.068	J	ng/g	0.912	0.021	1
Perfluoropentanoic Acid (PFPeA)	0.186	J	ng/g	0.912	0.042	1
Perfluorobutanesulfonic Acid (PFBS)	ND		ng/g	0.912	0.036	1
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	ND		ng/g	0.912	0.059	1
Perfluorohexanoic Acid (PFHxA)	0.113	J	ng/g	0.912	0.048	1
Perfluoropentanesulfonic Acid (PFPeS)	ND		ng/g	0.912	0.076	1
Perfluoroheptanoic Acid (PFHpA)	0.096	J	ng/g	0.912	0.041	1
Perfluorohexanesulfonic Acid (PFHxS)	ND		ng/g	0.912	0.055	1
Perfluorooctanoic Acid (PFOA)	0.069	JF	ng/g	0.912	0.038	1
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND		ng/g	0.912	0.164	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		ng/g	0.912	0.124	1
Perfluorononanoic Acid (PFNA)	0.110	J	ng/g	0.912	0.068	1
Perfluorooctanesulfonic Acid (PFOS)	0.559	J	ng/g	0.912	0.119	1
Perfluorodecanoic Acid (PFDA)	0.119	J	ng/g	0.912	0.061	1
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND		ng/g	0.912	0.262	1
Perfluorononanesulfonic Acid (PFNS)	ND		ng/g	0.912	0.273	1
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND		ng/g	0.912	0.184	1
Perfluoroundecanoic Acid (PFUnA)	0.092	J	ng/g	0.912	0.043	1
Perfluorodecanesulfonic Acid (PFDS)	ND		ng/g	0.912	0.140	1
Perfluorooctanesulfonamide (FOSA)	ND		ng/g	0.912	0.089	1
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND		ng/g	0.912	0.077	1
Perfluorododecanoic Acid (PFDoA)	ND		ng/g	0.912	0.064	1
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/g	0.912	0.186	1
Perfluorotetradecanoic Acid (PFTA)	ND		ng/g	0.912	0.049	1

Project Name: BARNSTABLE AIRPORT **Lab Number:** L2041358

Project Number: 20102 **Report Date:** 10/14/20

SAMPLE RESULTS

Lab ID: L2041358-03 Date Collected: 09/29/20 14:52

Client ID: A22(0-1) Date Received: 09/30/20

Sample Location: HYANNIS, MA Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor

Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab

Surrogate (Extracted Internal Standard)	% Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	**41**	Q	60-153
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	**53**	Q	65-182
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	106		70-151
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	105		56-138
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	**54**	Q	61-147
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	65		62-149
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	121		63-166
Perfluoro[13C8]Octanoic Acid (M8PFOA)	73		62-152
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	90		32-182
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	80		61-154
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	109		65-151
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	80		65-150
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	99		25-186
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	**20**	Q	45-137
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	94		64-158
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	10		1-125
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	**17**	Q	42-136
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	90		56-148
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	77		26-160

Project Name: BARNSTABLE AIRPORT **Lab Number:** L2041358

Project Number: 20102 **Report Date:** 10/14/20

SAMPLE RESULTS

Lab ID: L2041358-04
Client ID: A18(0-1)
Sample Location: HYANNIS, MA

Date Collected: 09/29/20 15:13
Date Received: 09/30/20
Field Prep: Not Specified

Sample Depth:
Matrix: Soil
Analytical Method: 134,LCMSMS-ID
Analytical Date: 10/09/20 03:18
Analyst: SG
Percent Solids: 98%

Extraction Method: ALPHA 23528
Extraction Date: 10/06/20 11:45

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						
Perfluorobutanoic Acid (PFBA)	0.218	J	ng/g	0.897	0.020	1
Perfluoropentanoic Acid (PFPeA)	0.332	J	ng/g	0.897	0.041	1
Perfluorobutanesulfonic Acid (PFBS)	ND		ng/g	0.897	0.035	1
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	ND		ng/g	0.897	0.058	1
Perfluorohexanoic Acid (PFHxA)	0.134	J	ng/g	0.897	0.047	1
Perfluoropentanesulfonic Acid (PFPeS)	ND		ng/g	0.897	0.075	1
Perfluoroheptanoic Acid (PFHpA)	0.076	J	ng/g	0.897	0.040	1
Perfluorohexanesulfonic Acid (PFHxS)	ND		ng/g	0.897	0.054	1
Perfluorooctanoic Acid (PFOA)	0.111	J	ng/g	0.897	0.038	1
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND		ng/g	0.897	0.161	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		ng/g	0.897	0.122	1
Perfluorononanoic Acid (PFNA)	0.281	J	ng/g	0.897	0.067	1
Perfluorooctanesulfonic Acid (PFOS)	1.15		ng/g	0.897	0.117	1
Perfluorodecanoic Acid (PFDA)	0.146	J	ng/g	0.897	0.060	1
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND		ng/g	0.897	0.257	1
Perfluorononanesulfonic Acid (PFNS)	ND		ng/g	0.897	0.268	1
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND		ng/g	0.897	0.181	1
Perfluoroundecanoic Acid (PFUnA)	0.204	J	ng/g	0.897	0.042	1
Perfluorodecanesulfonic Acid (PFDS)	ND		ng/g	0.897	0.137	1
Perfluorooctanesulfonamide (FOSA)	ND		ng/g	0.897	0.088	1
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND		ng/g	0.897	0.076	1
Perfluorododecanoic Acid (PFDoA)	ND		ng/g	0.897	0.063	1
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/g	0.897	0.183	1
Perfluorotetradecanoic Acid (PFTA)	ND		ng/g	0.897	0.048	1

Project Name: BARNSTABLE AIRPORT **Lab Number:** L2041358

Project Number: 20102 **Report Date:** 10/14/20

SAMPLE RESULTS

Lab ID: L2041358-04 Date Collected: 09/29/20 15:13

Client ID: A18(0-1) Date Received: 09/30/20

Sample Location: HYANNIS, MA Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor

Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab

Surrogate (Extracted Internal Standard)	% Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	91		60-153
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	106		65-182
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	116		70-151
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	120		56-138
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	93		61-147
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	100		62-149
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	133		63-166
Perfluoro[13C8]Octanoic Acid (M8PFOA)	101		62-152
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	100		32-182
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	109		61-154
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	121		65-151
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	106		65-150
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	110		25-186
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	**24**	Q	45-137
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	129		64-158
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	27		1-125
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	**26**	Q	42-136
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	120		56-148
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	101		26-160

Project Name: BARNSTABLE AIRPORT **Lab Number:** L2041358

Project Number: 20102 **Report Date:** 10/14/20

SAMPLE RESULTS

Lab ID: L2041358-05 RE
Client ID: DL15(0-1)
Sample Location: HYANNIS, MA

Date Collected: 09/30/20 11:22
Date Received: 09/30/20
Field Prep: Not Specified

Sample Depth:
Matrix: Soil
Analytical Method: 134,LCMSMS-ID
Analytical Date: 10/14/20 12:12
Analyst: JW
Percent Solids: 94%

Extraction Method: ALPHA 23528
Extraction Date: 10/13/20 18:30

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						
Perfluorobutanoic Acid (PFBA)	0.220	J	ng/g	3.89	0.088	1
Perfluoropentanoic Acid (PFPeA)	0.241	J	ng/g	3.89	0.179	1
Perfluorobutanesulfonic Acid (PFBS)	ND		ng/g	3.89	0.152	1
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	ND		ng/g	3.89	0.251	1
Perfluorohexanoic Acid (PFHxA)	0.278	J	ng/g	3.89	0.204	1
Perfluoropentanesulfonic Acid (PFPeS)	ND		ng/g	3.89	0.324	1
Perfluoroheptanoic Acid (PFHpA)	ND		ng/g	3.89	0.175	1
Perfluorohexanesulfonic Acid (PFHxS)	ND		ng/g	3.89	0.235	1
Perfluorooctanoic Acid (PFOA)	0.334	J	ng/g	3.89	0.163	1
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND		ng/g	3.89	0.698	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		ng/g	3.89	0.531	1
Perfluorononanoic Acid (PFNA)	ND		ng/g	3.89	0.292	1
Perfluorooctanesulfonic Acid (PFOS)	ND		ng/g	3.89	0.505	1
Perfluorodecanoic Acid (PFDA)	ND		ng/g	3.89	0.260	1
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND		ng/g	3.89	1.12	1
Perfluorononanesulfonic Acid (PFNS)	ND		ng/g	3.89	1.16	1
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND		ng/g	38.9	0.783	1
Perfluoroundecanoic Acid (PFUnA)	ND		ng/g	3.89	0.182	1
Perfluorodecanesulfonic Acid (PFDS)	ND		ng/g	3.89	0.595	1
Perfluorooctanesulfonamide (FOSA)	ND		ng/g	3.89	0.381	1
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	3.45	J	ng/g	3.89	0.328	1
Perfluorododecanoic Acid (PFDoA)	ND		ng/g	3.89	0.272	1
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/g	3.89	0.795	1
Perfluorotetradecanoic Acid (PFTA)	ND		ng/g	3.89	0.210	1

Project Name: BARNSTABLE AIRPORT **Lab Number:** L2041358

Project Number: 20102 **Report Date:** 10/14/20

SAMPLE RESULTS

Lab ID: L2041358-05 RE Date Collected: 09/30/20 11:22
Client ID: DL15(0-1) Date Received: 09/30/20
Sample Location: HYANNIS, MA Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						

Surrogate (Extracted Internal Standard)	% Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	**36**	Q	60-153
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	**39**	Q	65-182
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	**69**	Q	70-151
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	**23**	Q	56-138
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	**42**	Q	61-147
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	**47**	Q	62-149
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	79		63-166
Perfluoro[13C8]Octanoic Acid (M8PFOA)	**50**	Q	62-152
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	**31**	Q	32-182
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	**55**	Q	61-154
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	78		65-151
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	**54**	Q	65-150
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	39		25-186
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	**0**	Q	45-137
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	**56**	Q	64-158
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	12		1-125
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	**1**	Q	42-136
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	**53**	Q	56-148
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	34		26-160

Project Name: BARNSTABLE AIRPORT
Lab Number: L2041358
Project Number: 20102
Report Date: 10/14/20

SAMPLE RESULTS

Lab ID: L2041358-06
Client ID: DL16(0-1)
Sample Location: HYANNIS, MA

Date Collected: 09/30/20 11:34
Date Received: 09/30/20
Field Prep: Not Specified

Sample Depth:
Matrix: Soil
Analytical Method: 134,LCMSMS-ID
Analytical Date: 10/09/20 03:53
Analyst: SG
Percent Solids: 97%

Extraction Method: ALPHA 23528
Extraction Date: 10/06/20 11:45

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						
Perfluorobutanoic Acid (PFBA)	0.252	J	ng/g	0.939	0.021	1
Perfluoropentanoic Acid (PFPeA)	0.313	J	ng/g	0.939	0.043	1
Perfluorobutanesulfonic Acid (PFBS)	ND		ng/g	0.939	0.037	1
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	ND		ng/g	0.939	0.061	1
Perfluorohexanoic Acid (PFHxA)	0.184	J	ng/g	0.939	0.049	1
Perfluoropentanesulfonic Acid (PFPeS)	ND		ng/g	0.939	0.078	1
Perfluoroheptanoic Acid (PFHpA)	0.138	J	ng/g	0.939	0.042	1
Perfluorohexanesulfonic Acid (PFHxS)	ND		ng/g	0.939	0.057	1
Perfluorooctanoic Acid (PFOA)	0.223	J	ng/g	0.939	0.039	1
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND		ng/g	0.939	0.168	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		ng/g	0.939	0.128	1
Perfluorononanoic Acid (PFNA)	0.285	J	ng/g	0.939	0.070	1
Perfluorooctanesulfonic Acid (PFOS)	0.575	J	ng/g	0.939	0.122	1
Perfluorodecanoic Acid (PFDA)	0.181	J	ng/g	0.939	0.063	1
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND		ng/g	0.939	0.270	1
Perfluorononanesulfonic Acid (PFNS)	ND		ng/g	0.939	0.281	1
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND		ng/g	0.939	0.189	1
Perfluoroundecanoic Acid (PFUnA)	0.118	J	ng/g	0.939	0.044	1
Perfluorodecanesulfonic Acid (PFDS)	ND		ng/g	0.939	0.144	1
Perfluorooctanesulfonamide (FOSA)	ND		ng/g	0.939	0.092	1
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND		ng/g	0.939	0.079	1
Perfluorododecanoic Acid (PFDoA)	ND		ng/g	0.939	0.066	1
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/g	0.939	0.192	1
Perfluorotetradecanoic Acid (PFTA)	ND		ng/g	0.939	0.051	1

Project Name: BARNSTABLE AIRPORT **Lab Number:** L2041358

Project Number: 20102 **Report Date:** 10/14/20

SAMPLE RESULTS

Lab ID: L2041358-06 Date Collected: 09/30/20 11:34

Client ID: DL16(0-1) Date Received: 09/30/20

Sample Location: HYANNIS, MA Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor

Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab

Surrogate (Extracted Internal Standard)	% Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	63		60-153
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	74		65-182
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	109		70-151
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	85		56-138
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	69		61-147
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	78		62-149
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	124		63-166
Perfluoro[13C8]Octanoic Acid (M8PFOA)	79		62-152
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	78		32-182
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	89		61-154
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	115		65-151
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	88		65-150
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	100		25-186
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	**2**	Q	45-137
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	108		64-158
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	30		1-125
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	**4**	Q	42-136
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	100		56-148
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	104		26-160

Project Name: BARNSTABLE AIRPORT **Lab Number:** L2041358

Project Number: 20102 **Report Date:** 10/14/20

Method Blank Analysis
Batch Quality Control

Analytical Method: 134,LCMSMS-ID
Analytical Date: 10/09/20 01:39
Analyst: SG

Extraction Method: ALPHA 23528
Extraction Date: 10/06/20 11:45

Parameter	Result	Qualifier	Units	RL	MDL
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab for sample(s): 01-04,06 Batch: WG1418580-1					
Perfluorobutanoic Acid (PFBA)	ND		ng/g	1.00	0.023
Perfluoropentanoic Acid (PFPeA)	ND		ng/g	1.00	0.046
Perfluorobutanesulfonic Acid (PFBS)	ND		ng/g	1.00	0.039
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	ND		ng/g	1.00	0.065
Perfluorohexanoic Acid (PFHxA)	ND		ng/g	1.00	0.053
Perfluoropentanesulfonic Acid (PFPeS)	ND		ng/g	1.00	0.084
Perfluoroheptanoic Acid (PFHpA)	ND		ng/g	1.00	0.045
Perfluorohexanesulfonic Acid (PFHxS)	ND		ng/g	1.00	0.061
Perfluorooctanoic Acid (PFOA)	ND		ng/g	1.00	0.042
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND		ng/g	1.00	0.180
Perfluoroheptanesulfonic Acid (PFHpS)	ND		ng/g	1.00	0.136
Perfluorononanoic Acid (PFNA)	ND		ng/g	1.00	0.075
Perfluorooctanesulfonic Acid (PFOS)	ND		ng/g	1.00	0.130
Perfluorodecanoic Acid (PFDA)	ND		ng/g	1.00	0.067
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND		ng/g	1.00	0.287
Perfluorononanesulfonic Acid (PFNS)	ND		ng/g	1.00	0.299
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND		ng/g	1.00	0.202
Perfluoroundecanoic Acid (PFUnA)	ND		ng/g	1.00	0.047
Perfluorodecanesulfonic Acid (PFDS)	ND		ng/g	1.00	0.153
Perfluorooctanesulfonamide (FOSA)	ND		ng/g	1.00	0.098
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND		ng/g	1.00	0.085
Perfluorododecanoic Acid (PFDoA)	ND		ng/g	1.00	0.070
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/g	1.00	0.204
Perfluorotetradecanoic Acid (PFTA)	ND		ng/g	1.00	0.054

Project Name: BARNSTABLE AIRPORT **Lab Number:** L2041358

Project Number: 20102 **Report Date:** 10/14/20

Method Blank Analysis
Batch Quality Control

Analytical Method: 134,LCMSMS-ID
Analytical Date: 10/09/20 01:39
Analyst: SG

Extraction Method: ALPHA 23528
Extraction Date: 10/06/20 11:45

Parameter	Result	Qualifier	Units	RL	MDL
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab for sample(s): 01-04,06 Batch: WG1418580-1					

Surrogate (Extracted Internal Standard)	%Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	110		60-153
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	126		65-182
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	123		70-151
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	129		56-138
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	105		61-147
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	113		62-149
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	136		63-166
Perfluoro[13C8]Octanoic Acid (M8PFOA)	116		62-152
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	110		32-182
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	122		61-154
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	127		65-151
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	119		65-150
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	119		25-186
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	102		45-137
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	143		64-158
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	11		1-125
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	106		42-136
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	133		56-148
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	122		26-160

Project Name: BARNSTABLE AIRPORT **Lab Number:** L2041358

Project Number: 20102 **Report Date:** 10/14/20

Method Blank Analysis
Batch Quality Control

Analytical Method: 134,LCMSMS-ID
Analytical Date: 10/14/20 10:49
Analyst: JW

Extraction Method: ALPHA 23528
Extraction Date: 10/13/20 18:30

Parameter	Result	Qualifier	Units	RL	MDL
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab for sample(s): 05 Batch: WG1421673-1					
Perfluorobutanoic Acid (PFBA)	ND		ng/g	1.00	0.023
Perfluoropentanoic Acid (PFPeA)	ND		ng/g	1.00	0.046
Perfluorobutanesulfonic Acid (PFBS)	ND		ng/g	1.00	0.039
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	ND		ng/g	1.00	0.065
Perfluorohexanoic Acid (PFHxA)	ND		ng/g	1.00	0.053
Perfluoropentanesulfonic Acid (PFPeS)	ND		ng/g	1.00	0.084
Perfluoroheptanoic Acid (PFHpA)	ND		ng/g	1.00	0.045
Perfluorohexanesulfonic Acid (PFHxS)	ND		ng/g	1.00	0.061
Perfluorooctanoic Acid (PFOA)	ND		ng/g	1.00	0.042
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND		ng/g	1.00	0.180
Perfluoroheptanesulfonic Acid (PFHpS)	ND		ng/g	1.00	0.136
Perfluorononanoic Acid (PFNA)	ND		ng/g	1.00	0.075
Perfluorooctanesulfonic Acid (PFOS)	ND		ng/g	1.00	0.130
Perfluorodecanoic Acid (PFDA)	ND		ng/g	1.00	0.067
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND		ng/g	1.00	0.287
Perfluorononanesulfonic Acid (PFNS)	ND		ng/g	1.00	0.299
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND		ng/g	1.00	0.202
Perfluoroundecanoic Acid (PFUnA)	ND		ng/g	1.00	0.047
Perfluorodecanesulfonic Acid (PFDS)	ND		ng/g	1.00	0.153
Perfluorooctanesulfonamide (FOSA)	ND		ng/g	1.00	0.098
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND		ng/g	1.00	0.085
Perfluorododecanoic Acid (PFDoA)	ND		ng/g	1.00	0.070
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/g	1.00	0.204
Perfluorotetradecanoic Acid (PFTA)	ND		ng/g	1.00	0.054

Project Name: BARNSTABLE AIRPORT **Lab Number:** L2041358

Project Number: 20102 **Report Date:** 10/14/20

Method Blank Analysis
Batch Quality Control

Analytical Method: 134,LCMSMS-ID
Analytical Date: 10/14/20 10:49
Analyst: JW

Extraction Method: ALPHA 23528
Extraction Date: 10/13/20 18:30

Parameter	Result	Qualifier	Units	RL	MDL
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab for sample(s): 05 Batch: WG1421673-1					

Surrogate (Extracted Internal Standard)	%Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	94		60-153
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	94		65-182
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	97		70-151
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	60		56-138
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	94		61-147
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	98		62-149
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	106		63-166
Perfluoro[13C8]Octanoic Acid (M8PFOA)	100		62-152
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	70		32-182
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	108		61-154
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	100		65-151
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	97		65-150
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	78		25-186
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	62		45-137
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	101		64-158
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	8		1-125
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	67		42-136
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	97		56-148
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	72		26-160

Lab Control Sample Analysis
Batch Quality Control

Project Name: BARNSTABLE AIRPORT
Project Number: 20102
Lab Number: L2041358
Report Date: 10/14/20

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01-04,06 Batch: WG1418580-2 WG1418580-3								
Perfluorobutanoic Acid (PFBA)	98		96		71-135	2		30
Perfluoropentanoic Acid (PFPeA)	100		97		69-132	3		30
Perfluorobutanesulfonic Acid (PFBS)	100		97		72-128	3		30
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	112		109		62-145	3		30
Perfluorohexanoic Acid (PFHxA)	100		102		70-132	2		30
Perfluoropentanesulfonic Acid (PFPeS)	89		91		73-123	2		30
Perfluoroheptanoic Acid (PFHpA)	97		97		71-131	0		30
Perfluorohexanesulfonic Acid (PFHxS)	75		79		67-130	5		30
Perfluorooctanoic Acid (PFOA)	101		100		69-133	1		30
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	103		101		64-140	2		30
Perfluoroheptanesulfonic Acid (PFHpS)	93		86		70-132	8		30
Perfluorononanoic Acid (PFNA)	100		94		72-129	6		30
Perfluorooctanesulfonic Acid (PFOS)	100		94		68-136	6		30
Perfluorodecanoic Acid (PFDA)	102		100		69-133	2		30
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	107		110		65-137	3		30
Perfluorononanesulfonic Acid (PFNS)	105		98		69-125	7		30
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	136		89		63-144	**42**	Q	30
Perfluoroundecanoic Acid (PFUnA)	102		95		64-136	7		30
Perfluorodecanesulfonic Acid (PFDS)	106		101		59-134	5		30
Perfluorooctanesulfonamide (FOSA)	94		116		67-137	21		30
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	104		110		61-139	6		30
Perfluorododecanoic Acid (PFDoA)	93		89		69-135	4		30

Lab Control Sample Analysis

Batch Quality Control

Project Name: BARNSTABLE AIRPORT

Project Number: 20102

Lab Number: L2041358

Report Date: 10/14/20

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01-04,06 Batch: WG1418580-2 WG1418580-3								
Perfluorotridecanoic Acid (PFTrDA)	108		101		66-139	7		30
Perfluorotetradecanoic Acid (PFTA)	98		96		69-133	2		30

Surrogate (Extracted Internal Standard)	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	103		117		60-153
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	117		130		65-182
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	117		123		70-151
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	132		132		56-138
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	102		107		61-147
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	109		116		62-149
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	128		129		63-166
Perfluoro[13C8]Octanoic Acid (M8PFOA)	110		117		62-152
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	108		116		32-182
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	115		125		61-154
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	118		128		65-151
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	113		122		65-150
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	115		119		25-186
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	81		121		45-137
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	127		139		64-158
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	10		21		1-125
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	104		111		42-136
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	120		135		56-148
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	117		128		26-160

Lab Control Sample Analysis
Batch Quality Control

Project Name: BARNSTABLE AIRPORT
Project Number: 20102
Lab Number: L2041358
Report Date: 10/14/20

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 05 Batch: WG1421673-2 WG1421673-3								
Perfluorobutanoic Acid (PFBA)	99		101		71-135	2		30
Perfluoropentanoic Acid (PFPeA)	98		100		69-132	2		30
Perfluorobutanesulfonic Acid (PFBS)	92		94		72-128	2		30
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	112		118		62-145	5		30
Perfluorohexanoic Acid (PFHxA)	100		101		70-132	1		30
Perfluoropentanesulfonic Acid (PFPeS)	88		92		73-123	4		30
Perfluoroheptanoic Acid (PFHpA)	97		100		71-131	3		30
Perfluorohexanesulfonic Acid (PFHxS)	94		100		67-130	6		30
Perfluorooctanoic Acid (PFOA)	97		97		69-133	0		30
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	108		108		64-140	0		30
Perfluoroheptanesulfonic Acid (PFHpS)	94		101		70-132	7		30
Perfluorononanoic Acid (PFNA)	98		98		72-129	0		30
Perfluorooctanesulfonic Acid (PFOS)	107		104		68-136	3		30
Perfluorodecanoic Acid (PFDA)	96		98		69-133	2		30
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	110		113		65-137	3		30
Perfluorononanesulfonic Acid (PFNS)	111		108		69-125	3		30
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	108		99		63-144	9		30
Perfluoroundecanoic Acid (PFUnA)	101		106		64-136	5		30
Perfluorodecanesulfonic Acid (PFDS)	117		123		59-134	5		30
Perfluorooctanesulfonamide (FOSA)	92		105		67-137	13		30
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	104		107		61-139	3		30
Perfluorododecanoic Acid (PFDoA)	99		104		69-135	5		30

Lab Control Sample Analysis

Batch Quality Control

Project Name: BARNSTABLE AIRPORT

Project Number: 20102

Lab Number: L2041358

Report Date: 10/14/20

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 05 Batch: WG1421673-2 WG1421673-3								
Perfluorotridecanoic Acid (PFTrDA)	99		103		66-139	4		30
Perfluorotetradecanoic Acid (PFTA)	108		109		69-133	1		30

Surrogate (Extracted Internal Standard)	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	95		94		60-153
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	94		93		65-182
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	94		95		70-151
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	64		64		56-138
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	93		93		61-147
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	97		96		62-149
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	104		103		63-166
Perfluoro[13C8]Octanoic Acid (M8PFOA)	101		100		62-152
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	73		70		32-182
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	109		108		61-154
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	99		100		65-151
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	98		99		65-150
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	77		77		25-186
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	59		67		45-137
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	104		101		64-158
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	9		4		1-125
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	71		70		42-136
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	99		97		56-148
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	74		72		26-160

INORGANICS
&
MISCELLANEOUS

Project Name: BARNSTABLE AIRPORT
Project Number: 20102
Lab Number: L2041358
Report Date: 10/14/20

SAMPLE RESULTS

Lab ID: L2041358-01
Client ID: DL23(0-1)
Sample Location: HYANNIS, MA
Sample Depth:
Matrix: Soil

Date Collected: 09/29/20 14:10
Date Received: 09/30/20
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Mansfield Lab										
Solids, Total	95.8		%	0.100	0.100	1	-	10/01/20 10:33	121,2540G	JW

Project Name: BARNSTABLE AIRPORT
Project Number: 20102
Lab Number: L2041358
Report Date: 10/14/20

SAMPLE RESULTS

Lab ID: L2041358-02
Client ID: A13(0-1)
Sample Location: HYANNIS, MA
Sample Depth:
Matrix: Soil

Date Collected: 09/29/20 14:39
Date Received: 09/30/20
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Mansfield Lab										
Solids, Total	97.7		%	0.100	0.100	1	-	10/01/20 10:33	121,2540G	JW

Project Name: BARNSTABLE AIRPORT
Project Number: 20102
Lab Number: L2041358
Report Date: 10/14/20

SAMPLE RESULTS

Lab ID: L2041358-03
Client ID: A22(0-1)
Sample Location: HYANNIS, MA
Sample Depth:
Matrix: Soil

Date Collected: 09/29/20 14:52
Date Received: 09/30/20
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Mansfield Lab										
Solids, Total	97.2		%	0.100	0.100	1	-	10/01/20 10:33	121,2540G	JW

Project Name: BARNSTABLE AIRPORT
Project Number: 20102
Lab Number: L2041358
Report Date: 10/14/20

SAMPLE RESULTS

Lab ID: L2041358-04
Client ID: A18(0-1)
Sample Location: HYANNIS, MA
Sample Depth:
Matrix: Soil

Date Collected: 09/29/20 15:13
Date Received: 09/30/20
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Mansfield Lab										
Solids, Total	97.8		%	0.100	0.100	1	-	10/01/20 10:33	121,2540G	JW

Project Name: BARNSTABLE AIRPORT
Project Number: 20102
Lab Number: L2041358
Report Date: 10/14/20

SAMPLE RESULTS

Lab ID: L2041358-05
Client ID: DL15(0-1)
Sample Location: HYANNIS, MA
Sample Depth:
Matrix: Soil

Date Collected: 09/30/20 11:22
Date Received: 09/30/20
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Mansfield Lab										
Solids, Total	94.4		%	0.100	0.100	1	-	10/01/20 10:33	121,2540G	JW

Project Name: BARNSTABLE AIRPORT
Project Number: 20102
Lab Number: L2041358
Report Date: 10/14/20

SAMPLE RESULTS

Lab ID: L2041358-06
Client ID: DL16(0-1)
Sample Location: HYANNIS, MA
Sample Depth:
Matrix: Soil

Date Collected: 09/30/20 11:34
Date Received: 09/30/20
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Mansfield Lab										
Solids, Total	96.8		%	0.100	0.100	1	-	10/01/20 10:33	121,2540G	JW

Project Name: BARNSTABLE AIRPORT
Project Number: 20102

Lab Number: L2041358
Report Date: 10/14/20

Sample Receipt and Container Information

Were project specific reporting limits specified? YES

Cooler Information

Cooler	Custody Seal
A	Absent

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L2041358-01A	Plastic 8oz unpreserved	A	NA		5.5	Y	Absent		A2-537-ISOTOPE(14)
L2041358-01B	Plastic 2oz unpreserved for TS	A	NA		5.5	Y	Absent		A2-TS(7)
L2041358-02A	Plastic 8oz unpreserved	A	NA		5.5	Y	Absent		A2-537-ISOTOPE(14)
L2041358-02B	Plastic 2oz unpreserved for TS	A	NA		5.5	Y	Absent		A2-TS(7)
L2041358-03A	Plastic 8oz unpreserved	A	NA		5.5	Y	Absent		A2-537-ISOTOPE(14)
L2041358-03B	Plastic 2oz unpreserved for TS	A	NA		5.5	Y	Absent		A2-TS(7)
L2041358-04A	Plastic 8oz unpreserved	A	NA		5.5	Y	Absent		A2-537-ISOTOPE(14)
L2041358-04B	Plastic 2oz unpreserved for TS	A	NA		5.5	Y	Absent		A2-TS(7)
L2041358-05A	Plastic 8oz unpreserved	A	NA		5.5	Y	Absent		A2-537-ISOTOPE(14)
L2041358-05B	Plastic 2oz unpreserved for TS	A	NA		5.5	Y	Absent		A2-TS(7)
L2041358-06A	Plastic 8oz unpreserved	A	NA		5.5	Y	Absent		A2-537-ISOTOPE(14)
L2041358-06B	Plastic 2oz unpreserved for TS	A	NA		5.5	Y	Absent		A2-TS(7)

*Values in parentheses indicate holding time in days

Project Name: BARNSTABLE AIRPORT
Project Number: 20102
Lab Number: L2041358
Report Date: 10/14/20

PFAS PARAMETER SUMMARY

Parameter	Acronym	CAS Number
PERFLUOROALKYL CARBOXYLIC ACIDS (PFCAs)		
Perfluorooctadecanoic Acid	PFODA	16517-11-6
Perfluorohexadecanoic Acid	PFHxDA	67905-19-5
Perfluorotetradecanoic Acid	PFTA	376-06-7
Perfluorotridecanoic Acid	PFTrDA	72629-94-8
Perfluorododecanoic Acid	PFDoA	307-55-1
Perfluoroundecanoic Acid	PFUnA	2058-94-8
Perfluorodecanoic Acid	PFDA	335-76-2
Perfluorononanoic Acid	PFNA	375-95-1
Perfluorooctanoic Acid	PFOA	335-67-1
Perfluoroheptanoic Acid	PFHpA	375-85-9
Perfluorohexanoic Acid	PFHxA	307-24-4
Perfluoropentanoic Acid	PFPeA	2706-90-3
Perfluorobutanoic Acid	PFBA	375-22-4
PERFLUOROALKYL SULFONIC ACIDS (PFSAs)		
Perfluorododecanesulfonic Acid	PFDoDS	79780-39-5
Perfluorodecanesulfonic Acid	PFDS	335-77-3
Perfluorononanesulfonic Acid	PFNS	68259-12-1
Perfluorooctanesulfonic Acid	PFOS	1763-23-1
Perfluoroheptanesulfonic Acid	PFHpS	375-92-8
Perfluorohexanesulfonic Acid	PFHxS	355-46-4
Perfluoropentanesulfonic Acid	PFPeS	2706-91-4
Perfluorobutanesulfonic Acid	PFBS	375-73-5
FLUOROTELOMERS		
1H,1H,2H,2H-Perfluorododecanesulfonic Acid	10:2FTS	120226-60-0
1H,1H,2H,2H-Perfluorodecanesulfonic Acid	8:2FTS	39108-34-4
1H,1H,2H,2H-Perfluorooctanesulfonic Acid	6:2FTS	27619-97-2
1H,1H,2H,2H-Perfluorohexanesulfonic Acid	4:2FTS	757124-72-4
PERFLUOROALKANE SULFONAMIDES (FASAs)		
Perfluorooctanesulfonamide	FOSA	754-91-6
N-Ethyl Perfluorooctane Sulfonamide	NEtFOSA	4151-50-2
N-Methyl Perfluorooctane Sulfonamide	NMeFOSA	31506-32-8
PERFLUOROALKANE SULFONYL SUBSTANCES		
N-Ethyl Perfluorooctanesulfonamido Ethanol	NEtFOSE	1691-99-2
N-Methyl Perfluorooctanesulfonamido Ethanol	NMeFOSE	24448-09-7
N-Ethyl Perfluorooctanesulfonamidoacetic Acid	NEtFOSAA	2991-50-6
N-Methyl Perfluorooctanesulfonamidoacetic Acid	NMeFOSAA	2355-31-9
PER- and POLYFLUOROALKYL ETHER CARBOXYLIC ACIDS		
2,3,3,3-Tetrafluoro-2-[1,1,2,2,3,3,3-Heptafluoropropoxy]-Propanoic Acid	HFPO-DA	13252-13-6
4,8-Dioxa-3h-Perfluorononanoic Acid	ADONA	919005-14-4
CHLORO-PERFLUOROALKYL SULFONIC ACIDS		
11-Chloroeicosafluoro-3-Oxaundecane-1-Sulfonic Acid	11Cl-PF3OUdS	763051-92-9
9-Chlorohexadecafluoro-3-Oxanone-1-Sulfonic Acid	9Cl-PF3ONS	756426-58-1
PERFLUOROETHER SULFONIC ACIDS (PFESAs)		
Perfluoro(2-Ethoxyethane)Sulfonic Acid	PFEESA	113507-82-7
PERFLUOROETHER/POLYETHER CARBOXYLIC ACIDS (PFPCAs)		
Perfluoro-3-Methoxypropanoic Acid	PFMPA	377-73-1
Perfluoro-4-Methoxybutanoic Acid	PFMBA	863090-89-5
Nonafluoro-3,6-Dioxaheptanoic Acid	NFDHA	151772-58-6

Project Name:	BARNSTABLE AIRPORT	**Lab Number:**	L2041358
Project Number:	20102	**Report Date:**	10/14/20

GLOSSARY

Acronyms

DL - Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the limit of quantitation (LOQ). The DL includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

EDL - Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).

EMPC - Estimated Maximum Possible Concentration: The concentration that results from the signal present at the retention time of an analyte when the ions meet all of the identification criteria except the ion abundance ratio criteria. An EMPC is a worst-case estimate of the concentration.

EPA - Environmental Protection Agency.

LCS - Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

LCSD - Laboratory Control Sample Duplicate: Refer to LCS.

LFB - Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

LOD - Limit of Detection: This value represents the level to which a target analyte can reliably be detected for a specific analyte in a specific matrix by a specific method. The LOD includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

LOQ - Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

MDL - Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

MS - Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available. For Method 332.0, the spike recovery is calculated using the native concentration, including estimated values.

MSD - Matrix Spike Sample Duplicate: Refer to MS.

NA - Not Applicable.

NC - Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.

NDPA/DPA - N-Nitrosodiphenylamine/Diphenylamine.

NI - Not Ignitable.

NP - Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.

NR - No Results: Term is utilized when 'No Target Compounds Requested' is reported for the analysis of Volatile or Semivolatile Organic TIC only requests.

RL - Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

RPD - Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.

SRM - Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.

STLP - Semi-dynamic Tank Leaching Procedure per EPA Method 1315.

TEF - Toxic Equivalency Factors: The values assigned to each dioxin and furan to evaluate their toxicity relative to 2,3,7,8-TCDD.

TEQ - Toxic Equivalent: The measure of a sample's toxicity derived by multiplying each dioxin and furan by its corresponding TEF and then summing the resulting values.

TIC - Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

Report Format: DU Report with 'J' Qualifiers

Project Name:	BARNSTABLE AIRPORT	**Lab Number:**	L2041358
Project Number:	20102	**Report Date:**	10/14/20

Footnotes

1 - The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

Terms

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

Difference: With respect to Total Oxidizable Precursor (TOP) Assay analysis, the difference is defined as the Post-Treatment value minus the Pre-Treatment value.

Final pH: As it pertains to Sample Receipt & Container Information section of the report, Final pH reflects pH of container determined after adjustment at the laboratory, if applicable. If no adjustment required, value reflects Initial pH.

Frozen Date/Time: With respect to Volatile Organics in soil, Frozen Date/Time reflects the date/time at which associated Reagent Water-preserved vials were initially frozen. Note: If frozen date/time is beyond 48 hours from sample collection, value will be reflected in 'bold'.

Initial pH: As it pertains to Sample Receipt & Container Information section of the report, Initial pH reflects pH of container determined upon receipt, if applicable.

PAH Total: With respect to Alkylated PAH analyses, the 'PAHs, Total' result is defined as the summation of results for all or a subset of the following compounds: Naphthalene, C1-C4 Naphthalenes, 2-Methylnaphthalene, 1-Methylnaphthalene, Biphenyl, Acenaphthylene, Acenaphthene, Fluorene, C1-C3 Fluorenes, Phenanthrene, C1-C4 Phenanthrenes/Anthracenes, Anthracene, Fluoranthene, Pyrene, C1-C4 Fluoranthenes/Pyrenes, Benz(a)anthracene, Chrysene, C1-C4 Chrysenes, Benzo(b)fluoranthene, Benzo(j)+(k)fluoranthene, Benzo(e)pyrene, Benzo(a)pyrene, Perylene, Indeno(1,2,3-cd)pyrene, Dibenz(ah)+(ac)anthracene, Benzo(g,h,i)perylene. If a 'Total' result is requested, the results of its individual components will also be reported.

PFAS Total: With respect to PFAS analyses, the 'PFAS, Total (5)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA and PFOS. If a 'Total' result is requested, the results of its individual components will also be reported.

The target compound Chlordane (CAS No. 57-74-9) is reported for GC ECD analyses. Per EPA,this compound "refers to a mixture of chlordane isomers, other chlorinated hydrocarbons and numerous other components." (Reference: USEPA Toxicological Review of Chlordane, In Support of Summary Information on the Integrated Risk Information System (IRIS), December 1997.)

Total: With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

Data Qualifiers

A - Spectra identified as "Aldol Condensates" are byproducts of the extraction/concentration procedures when acetone is introduced in the process.

B - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).

C - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.

D - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.

E - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

F - The ratio of quantifier ion response to qualifier ion response falls outside of the laboratory criteria. Results are considered to be an estimated maximum concentration.

G - The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.

H - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.

I - The lower value for the two columns has been reported due to obvious interference.

J - Estimated value. The Target analyte concentration is below the quantitation limit (RL), but above the Method Detection Limit (MDL) or Estimated Detection Limit (EDL) for SPME-related analyses. This represents an estimated concentration for Tentatively Identified Compounds (TICs).

M - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.

ND - Not detected at the method detection limit (MDL) for the sample, or estimated detection limit (EDL) for SPME-related analyses.

NJ - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where

Report Format: DU Report with 'J' Qualifiers

Project Name:	BARNSTABLE AIRPORT	**Lab Number:**	L2041358
Project Number:	20102	**Report Date:**	10/14/20

Data Qualifiers

the identification is based on a mass spectral library search.

P - The RPD between the results for the two columns exceeds the method-specified criteria.

Q - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)

R - Analytical results are from sample re-analysis.

RE - Analytical results are from sample re-extraction.

S - Analytical results are from modified screening analysis.

Project Name: BARNSTABLE AIRPORT **Lab Number:** L2041358

Project Number: 20102 **Report Date:** 10/14/20

REFERENCES

121 Standard Methods for the Examination of Water and Wastewater. APHA-AWWA-WEF. Standard Methods Online.

134 Determination of Selected Perfluorinated Alkyl Acids in Drinking Water by Solid Phase Extraction and Liquid Chromatography/Tandem Mass Spectrometry (LC/MS/MS) using Isotope Dilution. Alpha SOP 23528.

LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.

Certification Information

The following analytes are not included in our Primary NELAP Scope of Accreditation:

Westborough Facility
EPA 624/624.1: m/p-xylene, o-xylene, Naphthalene
EPA 8260C: NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene; SCM: Iodomethane (methyl iodide), 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.
EPA 8270D: NPW: Dimethylnaphthalene,1,4-Diphenylhydrazine; SCM: Dimethylnaphthalene,1,4-Diphenylhydrazine.
SM4500: NPW: Amenable Cyanide; SCM: Total Phosphorus, TKN, NO2, NO3.

Mansfield Facility
SM 2540D: TSS
EPA 8082A: NPW: PCB: 1, 5, 31, 87,101, 110, 141, 151, 153, 180, 183, 187.
EPA TO-15: Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.
EPA TO-12 Non-methane organics
EPA 3C Fixed gases
Biological Tissue Matrix: EPA 3050B

The following analytes are included in our Massachusetts DEP Scope of Accreditation

Westborough Facility:

Drinking Water
EPA 300.0: Chloride, Nitrate-N, Fluoride, Sulfate; **EPA 353.2**: Nitrate-N, Nitrite-N; **SM4500NO3-F**: Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500Cl-D, SM2320B, SM2540C, SM4500H-B, SM4500NO2-B**
EPA 332: Perchlorate; **EPA 524.2:** THMs and VOCs; **EPA 504.1:** EDB, DBCP.
Microbiology: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT,SM9222D**.

Non-Potable Water
SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2320B, SM4500CL-E, SM4500F-BC, SM4500NH3-BH: Ammonia-N and Kjeldahl-N, **EPA 350.1**: Ammonia-N, **LACHAT 10-107-06-1-B**: Ammonia-N, **EPA 351.1, SM4500NO3-F, EPA 353.2**: Nitrate-N**, SM4500P-E, SM4500P-B, E, SM4500SO4-E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, EPA 420.1, SM4500-CN-CE, SM2540D, EPA 300: Chloride, Sulfate, Nitrate.**
EPA 624.1: Volatile Halocarbons & Aromatics,
EPA 608.3: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs
EPA 625.1: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045**: PCB-Oil.
Microbiology: **SM9223B-Colilert-QT; Enterolert-QT, SM9221E, EPA 1600, EPA 1603.**

Mansfield Facility:

Drinking Water
EPA 200.7: Al, Ba, Cd, Cr, Cu, Fe, Mn, Ni, Na, Ag, Ca, Zn. **EPA 200.8:** Al, Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Mn, Ni, Se, Ag, TL, Zn. **EPA 245.1** Hg.
EPA 522.

Non-Potable Water
EPA 200.7: Al, Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Sr, TL, Ti, V, Zn.
EPA 200.8: Al, Sb**,** As, Be, Cd, Cr, Cu, Fe, Pb, Mn, Ni, K, Se, Ag, Na, TL, Zn.
EPA 245.1 Hg.
SM2340B

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

CHAIN OF CUSTODY

PAGE 1 OF 1

Date Rec'd in Lab: 9/30/20

ALPHA Job #: L2041358

ALPHA
WESTBORO, MA TEL: 508-898-9220 FAX: 508-898-9193
MANSFIELD, MA TEL: 508-822-9300 FAX: 508-822-3288

Client Information

Client: Horsley Witten Group
Address: 90 Route 6A Sandwich MA 02563
Phone: (508) 833-6600
Fax:
Email: bmassa@horsleywitten.com
☐ These samples have been previously analyzed by Alpha

Project Information

Project Name: Barnstable Airport
Project Location: Hyannis, MA
Project #: 20102
Project Manager: Bryan Massa
ALPHA Quote #:

Turn-Around Time

☑ Standard ☐ RUSH (only confirmed if pre-approved)
Date Due: Time:

Report Information - Data Deliverables

☐ FAX ☐ EMAIL
☐ ADEx ☐ Add'l Deliverables

Billing Information

☐ Same as Client info PO #:

Regulatory Requirements/Report Limits

State /Fed Program | Criteria

Other Project Specific Requirements/Comments/Detection Limits:

ANALYSIS: PFAS 1:50 to 2 dilution

SAMPLE HANDLING

Filtration
☐ Done
☐ Not needed
☐ Lab to do
Preservation
☐ Lab to do
(Please specify below)

TOTAL # BOTTLES

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler's Initials		Sample Specific Comments
41358-01	DL23 (0-1)	9/29/20	14:10	Soil	SB	✓	
-02	A13 (0-1)	9/29/20	14:39	Soil	SB	✓	
-03	A22 (0-1)	9/29/20	14:52	Soil	SB	✓	
-04	A18 (0-1)	9/29/20	15:13	Soil	SB	✓	
-05	DL15 (0-1)	9/30/20	11:22	Soil	SB	✓	
-06	DL16 (0-1)	9/30/20	11:34	Soil	SB	✓	

Container Type							
Preservative							

Relinquished By:	Date/Time	Received By:	Date/Time
Sarah Bartlett	9/30/20 1700	TGeer/AAC	9-30-20 1257
TGeer/AAC	9-30-20 1800		9-30-20 1720
	9-30-20 1920		9/30/20 1920
	9/30/20 2000		9/30/20 2008

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. All samples submitted are subject to Alpha's Terms and Conditions. See reverse side.

FORM NO. 01-01 (rev. 14-OCT-07)

ANALYTICAL REPORT

Lab Number:	L2040892
Client:	Horseley & Witten, Inc. Sextant Hill Office Park 90 Route 6A Sandwich, MA 02563
ATTN:	Brian Massa
Phone:	(508) 833-6600
Project Name:	BARNSTABLE AIRPORT
Project Number:	20102
Report Date:	10/12/20

The original project report/data package is held by Alpha Analytical. This report/data package is paginated and should be reproduced only in its entirety. Alpha Analytical holds no responsibility for results and/or data that are not consistent with the original.

Certifications & Approvals: MA (M-MA030), NH NELAP (2062), CT (PH-0141), DoD (L2474), FL (E87814), IL (200081), LA (85084), ME (MA00030), MD (350), NJ (MA015), NY (11627), NC (685), OH (CL106), PA (68-02089), RI (LAO00299), TX (T104704419), VT (VT-0015), VA (460194), WA (C954), US Army Corps of Engineers, USDA (Permit #P330-17-00150), USFWS (Permit #206964).

320 Forbes Boulevard, Mansfield, MA 02048-1806
508-822-9300 (Fax) 508-822-3288 800-624-9220 - www.alphalab.com

Project Name: BARNSTABLE AIRPORT
Project Number: 20102

Lab Number: L2040892
Report Date: 10/12/20

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L2040892-01	DL22(2-4)	SOIL	HYANNIS MA	09/25/20 12:45	09/28/20
L2040892-02	DL22(6-8)	SOIL	HYANNIS MA	09/25/20 12:51	09/28/20
L2040892-03	DL22(18-20)	SOIL	HYANNIS MA	09/25/20 12:57	09/28/20
L2040892-04	DL19(0-1)	SOIL	HYANNIS MA	09/25/20 13:27	09/28/20
L2040892-05	DL20(0-1)	SOIL	HYANNIS MA	09/25/20 13:34	09/28/20
L2040892-06	DL21(0-1)	SOIL	HYANNIS MA	09/25/20 13:40	09/28/20
L2040892-07	DL18(0-1)	SOIL	HYANNIS MA	09/25/20 15:00	09/28/20
L2040892-08	DL17(0-1)	SOIL	HYANNIS MA	09/25/20 15:15	09/28/20

Project Name: BARNSTABLE AIRPORT **Lab Number:** L2040892

Project Number: 20102 **Report Date:** 10/12/20

MADEP MCP Response Action Analytical Report Certification

This form provides certifications for all samples performed by MCP methods. Please refer to the Sample Results and Container Information sections of this report for specification of MCP methods used for each analysis. The following questions pertain only to MCP Analytical Methods.

An affirmative response to questions A through F is required for "Presumptive Certainty" status		
A	Were all samples received in a condition consistent with those described on the Chain-of-Custody, properly preserved (including temperature) in the field or laboratory, and prepared/analyzed within method holding times?	YES
B	Were the analytical method(s) and all associated QC requirements specified in the selected CAM protocol(s) followed?	YES
C	Were all required corrective actions and analytical response actions specified in the selected CAM protocol(s) implemented for all identified performance standard non-conformances?	YES
D	Does the laboratory report comply with all the reporting requirements specified in CAM VII A, "Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data?"	YES
E a.	VPH, EPH, and APH Methods only: Was each method conducted without significant modification(s)? (Refer to the individual method(s) for a list of significant modifications).	N/A
E b.	APH and TO-15 Methods only: Was the complete analyte list reported for each method?	N/A
F	Were all applicable CAM protocol QC and performance standard non-conformances identified and evaluated in a laboratory narrative (including all "No" responses to Questions A through E)?	YES

A response to questions G, H and I is required for "Presumptive Certainty" status		
G	Were the reporting limits at or below all CAM reporting limits specified in the selected CAM protocol(s)?	YES
H	Were all QC performance standards specified in the CAM protocol(s) achieved?	YES
I	Were results reported for the complete analyte list specified in the selected CAM protocol(s)?	YES

For any questions answered "No", please refer to the case narrative section on the following page(s).

Please note that sample matrix information is located in the Sample Results section of this report.

Project Name:	BARNSTABLE AIRPORT	**Lab Number:**	L2040892
Project Number:	20102	**Report Date:**	10/12/20

Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet NELAP requirements for all NELAP accredited parameters unless otherwise noted in the following narrative. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively.

When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances, the specific failure is not narrated but noted in the associated QC Outlier Summary Report, located directly after the Case Narrative. QC information is also incorporated in the Data Usability Assessment table (Format 11) of our Data Merger tool, where it can be reviewed in conjunction with the sample result, associated regulatory criteria and any associated data usability implications.

Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

HOLD POLICY - For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Alpha Project Manager and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Project Management at 800-624-9220 with any questions.

Project Name:	BARNSTABLE AIRPORT	**Lab Number:**	L2040892
Project Number:	20102	**Report Date:**	10/12/20

Case Narrative (continued)

Report Submission

All non-detect (ND) or estimated concentrations (J-qualified) have been quantitated to the limit noted in the MDL column.

MCP Related Narratives

Report Submission

All MCP required questions were answered with affirmative responses; therefore, there are no relevant protocol-specific QC and/or performance standard non-conformances to report.

Non-MCP Related Narratives

Perfluorinated Alkyl Acids by Isotope Dilution

L2040892-01 and -07: Extracted Internal Standard recoveries were outside the acceptance criteria for individual analytes. Please refer to the surrogate section of the report for details.

L2040892-04, -05, -06, and -08RE: Extracted Internal Standard recoveries were outside the acceptance criteria for individual analytes. Please refer to the surrogate section of the report for details.

L2040892-04, -05, -06, and -08RE: The sample was re-extracted within holding time due to QC failures in the original extraction. The results of the re-extraction are reported.

L2040892-04, -05, -06, and -08RE: The sample has elevated detection limits due to the limited sample volume utilized during extraction, as required by the sample matrix.

L2040892-05RE: The reporting limit was elevated for NMeFOSAA due to low EIS recovery of d3-NMeFOSAA. The low recovery was attributed to the sample matrix.

L2040892-06RE: The reporting limit was elevated for NMeFOSAA and NEtFOSAA, due to low EIS recovery of d3-NMeFOSAA and d5-NetFOSAA. The low recovery was attributed to the sample matrix.

L2040892-08RE: The reporting limit was elevated for NEtFOSAA, due to low EIS recovery of d5-NetFOSAA. The low recovery was attributed to the sample matrix.

WG1418146-4: Extracted Internal Standard recoveries were outside the acceptance criteria for individual analytes. Please refer to the surrogate section of the report for details.

Project Name:	BARNSTABLE AIRPORT	**Lab Number:**	L2040892
Project Number:	20102	**Report Date:**	10/12/20

Case Narrative (continued)

The WG1418146-4 MS recovey, performed on L2040892-01, is outside the acceptance criteria for 1h,1h,2h,2h-perfluorodecanesulfonic acid (8:2fts) (9%).

WG1420434-2 and WG1420434-3R: The sample was re-analyzed due to QC failures in the original analysis. The results of the re-analysis are reported.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature: Susan E O'Neil Susan O' Neil

Title: Technical Director/Representative Date: 10/12/20

QC OUTLIER SUMMARY REPORT

Project Name: BARNSTABLE AIRPORT
Project Number: 20102

Lab Number: L2040892
Report Date: 10/12/20

Method	Client ID (Native ID)	Lab ID	Parameter	QC Type	Recovery/RPD (%)	QC Limits (%)	Associated Samples	Data Quality Assessment
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab								
LCMSMS-ID	Batch QC (L2040892-01)	WG1418146-4	1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	MS	9	65-137	01,07	potential low bias

ORGANICS

SEMIVOLATILES

Project Name: BARNSTABLE AIRPORT **Lab Number:** L2040892

Project Number: 20102 **Report Date:** 10/12/20

SAMPLE RESULTS

Lab ID: L2040892-01
Client ID: DL22(2-4)
Sample Location: HYANNIS MA

Date Collected: 09/25/20 12:45
Date Received: 09/28/20
Field Prep: Not Specified

Sample Depth:
Matrix: Soil
Analytical Method: 134,LCMSMS-ID
Analytical Date: 10/08/20 14:35
Analyst: SG
Percent Solids: 98%

Extraction Method: ALPHA 23528
Extraction Date: 10/05/20 12:45

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						
Perfluorobutanoic Acid (PFBA)	0.076	J	ng/g	0.946	0.022	1
Perfluoropentanoic Acid (PFPeA)	0.151	J	ng/g	0.946	0.044	1
Perfluorobutanesulfonic Acid (PFBS)	ND		ng/g	0.946	0.037	1
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	ND		ng/g	0.946	0.061	1
Perfluorohexanoic Acid (PFHxA)	0.116	JF	ng/g	0.946	0.050	1
Perfluoropentanesulfonic Acid (PFPeS)	ND		ng/g	0.946	0.079	1
Perfluoroheptanoic Acid (PFHpA)	0.109	J	ng/g	0.946	0.043	1
Perfluorohexanesulfonic Acid (PFHxS)	ND		ng/g	0.946	0.057	1
Perfluorooctanoic Acid (PFOA)	0.447	J	ng/g	0.946	0.040	1
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	7.49		ng/g	0.946	0.170	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		ng/g	0.946	0.129	1
Perfluorononanoic Acid (PFNA)	5.46		ng/g	0.946	0.071	1
Perfluorooctanesulfonic Acid (PFOS)	20.3		ng/g	0.946	0.123	1
Perfluorodecanoic Acid (PFDA)	0.834	J	ng/g	0.946	0.063	1
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	31.6		ng/g	0.946	0.272	1
Perfluorononanesulfonic Acid (PFNS)	ND		ng/g	0.946	0.283	1
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND		ng/g	0.946	0.191	1
Perfluoroundecanoic Acid (PFUnA)	0.230	J	ng/g	0.946	0.044	1
Perfluorodecanesulfonic Acid (PFDS)	ND		ng/g	0.946	0.145	1
Perfluorooctanesulfonamide (FOSA)	ND		ng/g	0.946	0.093	1
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND		ng/g	0.946	0.080	1
Perfluorododecanoic Acid (PFDoA)	ND		ng/g	0.946	0.066	1
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/g	0.946	0.193	1
Perfluorotetradecanoic Acid (PFTA)	ND		ng/g	0.946	0.051	1

Project Name: BARNSTABLE AIRPORT **Lab Number:** L2040892

Project Number: 20102 **Report Date:** 10/12/20

SAMPLE RESULTS

Lab ID: L2040892-01 Date Collected: 09/25/20 12:45

Client ID: DL22(2-4) Date Received: 09/28/20

Sample Location: HYANNIS MA Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor

Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab

Surrogate (Extracted Internal Standard)	% Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	81		60-153
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	92		65-182
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	103		70-151
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	97		56-138
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	79		61-147
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	86		62-149
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	106		63-166
Perfluoro[13C8]Octanoic Acid (M8PFOA)	87		62-152
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	89		32-182
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	91		61-154
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	105		65-151
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	90		65-150
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	111		25-186
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	**4**	Q	45-137
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	104		64-158
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	29		1-125
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	**6**	Q	42-136
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	95		56-148
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	77		26-160

Project Name: BARNSTABLE AIRPORT **Lab Number:** L2040892

Project Number: 20102 **Report Date:** 10/12/20

SAMPLE RESULTS

Lab ID: L2040892-04 RE
Client ID: DL19(0-1)
Sample Location: HYANNIS MA

Date Collected: 09/25/20 13:27
Date Received: 09/28/20
Field Prep: Not Specified

Sample Depth:
Matrix: Soil
Analytical Method: 134,LCMSMS-ID
Analytical Date: 10/10/20 14:18
Analyst: SG
Percent Solids: 96%

Extraction Method: EPA 537(M)
Extraction Date: 10/09/20 19:30

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						
Perfluorobutanoic Acid (PFBA)	ND		ng/g	3.22	0.073	1
Perfluoropentanoic Acid (PFPeA)	ND		ng/g	3.22	0.148	1
Perfluorobutanesulfonic Acid (PFBS)	ND		ng/g	3.22	0.125	1
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	ND		ng/g	3.22	0.207	1
Perfluorohexanoic Acid (PFHxA)	ND		ng/g	3.22	0.169	1
Perfluoropentanesulfonic Acid (PFPeS)	ND		ng/g	3.22	0.268	1
Perfluoroheptanoic Acid (PFHpA)	ND		ng/g	3.22	0.145	1
Perfluorohexanesulfonic Acid (PFHxS)	ND		ng/g	3.22	0.194	1
Perfluorooctanoic Acid (PFOA)	ND		ng/g	3.22	0.135	1
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND		ng/g	3.22	0.577	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		ng/g	3.22	0.439	1
Perfluorononanoic Acid (PFNA)	ND		ng/g	3.22	0.241	1
Perfluorooctanesulfonic Acid (PFOS)	ND		ng/g	3.22	0.418	1
Perfluorodecanoic Acid (PFDA)	ND		ng/g	3.22	0.215	1
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND		ng/g	3.22	0.923	1
Perfluorononanesulfonic Acid (PFNS)	ND		ng/g	3.22	0.961	1
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND		ng/g	3.22	0.648	1
Perfluoroundecanoic Acid (PFUnA)	ND		ng/g	3.22	0.150	1
Perfluorodecanesulfonic Acid (PFDS)	ND		ng/g	3.22	0.492	1
Perfluorooctanesulfonamide (FOSA)	ND		ng/g	3.22	0.315	1
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND		ng/g	3.22	0.272	1
Perfluorododecanoic Acid (PFDoA)	ND		ng/g	3.22	0.225	1
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/g	3.22	0.658	1
Perfluorotetradecanoic Acid (PFTA)	ND		ng/g	3.22	0.174	1

Project Name: BARNSTABLE AIRPORT **Lab Number:** L2040892

Project Number: 20102 **Report Date:** 10/12/20

SAMPLE RESULTS

Lab ID: L2040892-04 RE Date Collected: 09/25/20 13:27
Client ID: DL19(0-1) Date Received: 09/28/20
Sample Location: HYANNIS MA Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor

Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab

Surrogate (Extracted Internal Standard)	% Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	**41**	Q	60-153
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	**50**	Q	65-182
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	84		70-151
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	**39**	Q	56-138
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	**42**	Q	61-147
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	**48**	Q	62-149
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	95		63-166
Perfluoro[13C8]Octanoic Acid (M8PFOA)	**51**	Q	62-152
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	43		32-182
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	**55**	Q	61-154
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	94		65-151
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	**55**	Q	65-150
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	60		25-186
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	**3**	Q	45-137
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	64		64-158
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	40		1-125
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	**1**	Q	42-136
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	64		56-148
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	63		26-160

Project Name: BARNSTABLE AIRPORT **Lab Number:** L2040892

Project Number: 20102 **Report Date:** 10/12/20

SAMPLE RESULTS

Lab ID: L2040892-05 RE
Client ID: DL20(0-1)
Sample Location: HYANNIS MA

Date Collected: 09/25/20 13:34
Date Received: 09/28/20
Field Prep: Not Specified

Sample Depth:
Matrix: Soil
Analytical Method: 134,LCMSMS-ID
Analytical Date: 10/10/20 14:35
Analyst: SG
Percent Solids: 95%

Extraction Method: EPA 537(M)
Extraction Date: 10/09/20 19:30

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						
Perfluorobutanoic Acid (PFBA)	ND		ng/g	3.48	0.079	1
Perfluoropentanoic Acid (PFPeA)	ND		ng/g	3.48	0.160	1
Perfluorobutanesulfonic Acid (PFBS)	ND		ng/g	3.48	0.136	1
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	ND		ng/g	3.48	0.224	1
Perfluorohexanoic Acid (PFHxA)	ND		ng/g	3.48	0.183	1
Perfluoropentanesulfonic Acid (PFPeS)	ND		ng/g	3.48	0.290	1
Perfluoroheptanoic Acid (PFHpA)	ND		ng/g	3.48	0.157	1
Perfluorohexanesulfonic Acid (PFHxS)	ND		ng/g	3.48	0.210	1
Perfluorooctanoic Acid (PFOA)	ND		ng/g	3.48	0.146	1
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND		ng/g	3.48	0.625	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		ng/g	3.48	0.475	1
Perfluorononanoic Acid (PFNA)	ND		ng/g	3.48	0.261	1
Perfluorooctanesulfonic Acid (PFOS)	ND		ng/g	3.48	0.452	1
Perfluorodecanoic Acid (PFDA)	ND		ng/g	3.48	0.233	1
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND		ng/g	3.48	0.999	1
Perfluorononanesulfonic Acid (PFNS)	ND		ng/g	3.48	1.04	1
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND		ng/g	34.8	0.701	1
Perfluoroundecanoic Acid (PFUnA)	ND		ng/g	3.48	0.163	1
Perfluorodecanesulfonic Acid (PFDS)	ND		ng/g	3.48	0.532	1
Perfluorooctanesulfonamide (FOSA)	ND		ng/g	3.48	0.341	1
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND		ng/g	3.48	0.294	1
Perfluorododecanoic Acid (PFDoA)	ND		ng/g	3.48	0.244	1
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/g	3.48	0.712	1
Perfluorotetradecanoic Acid (PFTA)	ND		ng/g	3.48	0.188	1

Project Name: BARNSTABLE AIRPORT **Lab Number:** L2040892

Project Number: 20102 **Report Date:** 10/12/20

SAMPLE RESULTS

Lab ID: L2040892-05 RE Date Collected: 09/25/20 13:34
Client ID: DL20(0-1) Date Received: 09/28/20
Sample Location: HYANNIS MA Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor

Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab

Surrogate (Extracted Internal Standard)	% Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	63		60-153
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	77		65-182
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	102		70-151
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	62		56-138
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	66		61-147
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	74		62-149
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	115		63-166
Perfluoro[13C8]Octanoic Acid (M8PFOA)	80		62-152
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	71		32-182
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	86		61-154
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	111		65-151
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	83		65-150
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	102		25-186
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	**0**	Q	45-137
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	92		64-158
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	44		1-125
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	**1**	Q	42-136
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	95		56-148
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	95		26-160

Project Name: BARNSTABLE AIRPORT **Lab Number:** L2040892

Project Number: 20102 **Report Date:** 10/12/20

SAMPLE RESULTS

Lab ID: L2040892-06 RE
Client ID: DL21(0-1)
Sample Location: HYANNIS MA

Date Collected: 09/25/20 13:40
Date Received: 09/28/20
Field Prep: Not Specified

Sample Depth:
Matrix: Soil
Analytical Method: 134,LCMSMS-ID
Analytical Date: 10/10/20 14:52
Analyst: SG
Percent Solids: 95%

Extraction Method: EPA 537(M)
Extraction Date: 10/09/20 19:30

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						
Perfluorobutanoic Acid (PFBA)	ND		ng/g	3.50	0.080	1
Perfluoropentanoic Acid (PFPeA)	0.256	J	ng/g	3.50	0.161	1
Perfluorobutanesulfonic Acid (PFBS)	ND		ng/g	3.50	0.137	1
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	ND		ng/g	3.50	0.226	1
Perfluorohexanoic Acid (PFHxA)	0.265	JF	ng/g	3.50	0.184	1
Perfluoropentanesulfonic Acid (PFPeS)	ND		ng/g	3.50	0.293	1
Perfluoroheptanoic Acid (PFHpA)	ND		ng/g	3.50	0.158	1
Perfluorohexanesulfonic Acid (PFHxS)	ND		ng/g	3.50	0.212	1
Perfluorooctanoic Acid (PFOA)	0.159	J	ng/g	3.50	0.147	1
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND		ng/g	3.50	0.629	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		ng/g	3.50	0.478	1
Perfluorononanoic Acid (PFNA)	ND		ng/g	3.50	0.263	1
Perfluorooctanesulfonic Acid (PFOS)	ND		ng/g	3.50	0.456	1
Perfluorodecanoic Acid (PFDA)	ND		ng/g	3.50	0.235	1
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND		ng/g	3.50	1.00	1
Perfluorononanesulfonic Acid (PFNS)	ND		ng/g	3.50	1.05	1
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND		ng/g	35.0	0.706	1
Perfluoroundecanoic Acid (PFUnA)	ND		ng/g	3.50	0.164	1
Perfluorodecanesulfonic Acid (PFDS)	ND		ng/g	3.50	0.536	1
Perfluorooctanesulfonamide (FOSA)	ND		ng/g	3.50	0.343	1
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND		ng/g	35.0	0.296	1
Perfluorododecanoic Acid (PFDoA)	ND		ng/g	3.50	0.245	1
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/g	3.50	0.717	1
Perfluorotetradecanoic Acid (PFTA)	ND		ng/g	3.50	0.189	1

Project Name: BARNSTABLE AIRPORT **Lab Number:** L2040892

Project Number: 20102 **Report Date:** 10/12/20

SAMPLE RESULTS

Lab ID: L2040892-06 RE Date Collected: 09/25/20 13:40
Client ID: DL21(0-1) Date Received: 09/28/20
Sample Location: HYANNIS MA Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor

Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab

Surrogate (Extracted Internal Standard)	% Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	**35**	Q	60-153
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	**43**	Q	65-182
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	89		70-151
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	**32**	Q	56-138
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	**37**	Q	61-147
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	**41**	Q	62-149
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	99		63-166
Perfluoro[13C8]Octanoic Acid (M8PFOA)	**45**	Q	62-152
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	40		32-182
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	**48**	Q	61-154
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	97		65-151
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	**49**	Q	65-150
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	61		25-186
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	**0**	Q	45-137
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	**57**	Q	64-158
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	33		1-125
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	**0**	Q	42-136
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	**50**	Q	56-148
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	55		26-160

Project Name: BARNSTABLE AIRPORT **Lab Number:** L2040892

Project Number: 20102 **Report Date:** 10/12/20

SAMPLE RESULTS

Lab ID: L2040892-07
Client ID: DL18(0-1)
Sample Location: HYANNIS MA

Date Collected: 09/25/20 15:00
Date Received: 09/28/20
Field Prep: Not Specified

Sample Depth:
Matrix: Soil
Analytical Method: 134,LCMSMS-ID
Analytical Date: 10/08/20 17:47
Analyst: SG
Percent Solids: 86%

Extraction Method: ALPHA 23528
Extraction Date: 10/05/20 12:45

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						
Perfluorobutanoic Acid (PFBA)	0.597	J	ng/g	1.06	0.024	1
Perfluoropentanoic Acid (PFPeA)	0.693	J	ng/g	1.06	0.049	1
Perfluorobutanesulfonic Acid (PFBS)	ND		ng/g	1.06	0.041	1
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	ND		ng/g	1.06	0.068	1
Perfluorohexanoic Acid (PFHxA)	0.461	J	ng/g	1.06	0.056	1
Perfluoropentanesulfonic Acid (PFPeS)	ND		ng/g	1.06	0.089	1
Perfluoroheptanoic Acid (PFHpA)	0.319	J	ng/g	1.06	0.048	1
Perfluorohexanesulfonic Acid (PFHxS)	0.159	J	ng/g	1.06	0.064	1
Perfluorooctanoic Acid (PFOA)	0.979	J	ng/g	1.06	0.044	1
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND		ng/g	1.06	0.190	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		ng/g	1.06	0.145	1
Perfluorononanoic Acid (PFNA)	0.296	J	ng/g	1.06	0.080	1
Perfluorooctanesulfonic Acid (PFOS)	1.05	J	ng/g	1.06	0.138	1
Perfluorodecanoic Acid (PFDA)	0.167	JF	ng/g	1.06	0.071	1
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND		ng/g	1.06	0.304	1
Perfluorononanesulfonic Acid (PFNS)	ND		ng/g	1.06	0.317	1
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND		ng/g	1.06	0.213	1
Perfluoroundecanoic Acid (PFUnA)	0.119	J	ng/g	1.06	0.050	1
Perfluorodecanesulfonic Acid (PFDS)	ND		ng/g	1.06	0.162	1
Perfluorooctanesulfonamide (FOSA)	ND		ng/g	1.06	0.104	1
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND		ng/g	1.06	0.090	1
Perfluorododecanoic Acid (PFDoA)	ND		ng/g	1.06	0.074	1
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/g	1.06	0.217	1
Perfluorotetradecanoic Acid (PFTA)	ND		ng/g	1.06	0.057	1

Project Name: BARNSTABLE AIRPORT **Lab Number:** L2040892

Project Number: 20102 **Report Date:** 10/12/20

SAMPLE RESULTS

Lab ID: L2040892-07 Date Collected: 09/25/20 15:00

Client ID: DL18(0-1) Date Received: 09/28/20

Sample Location: HYANNIS MA Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor

Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab

Surrogate (Extracted Internal Standard)	% Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	70		60-153
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	80		65-182
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	87		70-151
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	92		56-138
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	70		61-147
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	75		62-149
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	87		63-166
Perfluoro[13C8]Octanoic Acid (M8PFOA)	77		62-152
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	79		32-182
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	82		61-154
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	92		65-151
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	80		65-150
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	76		25-186
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	**39**	Q	45-137
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	98		64-158
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	7		1-125
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	52		42-136
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	84		56-148
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	71		26-160

Project Name: BARNSTABLE AIRPORT **Lab Number:** L2040892

Project Number: 20102 **Report Date:** 10/12/20

SAMPLE RESULTS

Lab ID: L2040892-08 RE
Client ID: DL17(0-1)
Sample Location: HYANNIS MA

Date Collected: 09/25/20 15:15
Date Received: 09/28/20
Field Prep: Not Specified

Sample Depth:
Matrix: Soil
Analytical Method: 134,LCMSMS-ID
Analytical Date: 10/10/20 15:08
Analyst: SG
Percent Solids: 96%

Extraction Method: EPA 537(M)
Extraction Date: 10/09/20 19:30

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						
Perfluorobutanoic Acid (PFBA)	ND		ng/g	3.70	0.084	1
Perfluoropentanoic Acid (PFPeA)	0.214	J	ng/g	3.70	0.170	1
Perfluorobutanesulfonic Acid (PFBS)	ND		ng/g	3.70	0.144	1
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	ND		ng/g	3.70	0.238	1
Perfluorohexanoic Acid (PFHxA)	0.248	J	ng/g	3.70	0.194	1
Perfluoropentanesulfonic Acid (PFPeS)	ND		ng/g	3.70	0.309	1
Perfluoroheptanoic Acid (PFHpA)	ND		ng/g	3.70	0.167	1
Perfluorohexanesulfonic Acid (PFHxS)	ND		ng/g	3.70	0.224	1
Perfluorooctanoic Acid (PFOA)	0.166	J	ng/g	3.70	0.155	1
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND		ng/g	3.70	0.664	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		ng/g	3.70	0.505	1
Perfluorononanoic Acid (PFNA)	ND		ng/g	3.70	0.277	1
Perfluorooctanesulfonic Acid (PFOS)	ND		ng/g	3.70	0.481	1
Perfluorodecanoic Acid (PFDA)	ND		ng/g	3.70	0.248	1
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND		ng/g	3.70	1.06	1
Perfluorononanesulfonic Acid (PFNS)	ND		ng/g	3.70	1.10	1
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND		ng/g	3.70	0.745	1
Perfluoroundecanoic Acid (PFUnA)	ND		ng/g	3.70	0.173	1
Perfluorodecanesulfonic Acid (PFDS)	ND		ng/g	3.70	0.566	1
Perfluorooctanesulfonamide (FOSA)	ND		ng/g	3.70	0.362	1
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND		ng/g	37.0	0.312	1
Perfluorododecanoic Acid (PFDoA)	ND		ng/g	3.70	0.259	1
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/g	3.70	0.756	1
Perfluorotetradecanoic Acid (PFTA)	ND		ng/g	3.70	0.200	1

Project Name: BARNSTABLE AIRPORT **Lab Number:** L2040892

Project Number: 20102 **Report Date:** 10/12/20

SAMPLE RESULTS

Lab ID: L2040892-08 RE Date Collected: 09/25/20 15:15
Client ID: DL17(0-1) Date Received: 09/28/20
Sample Location: HYANNIS MA Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor

Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab

Surrogate (Extracted Internal Standard)	% Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	**46**	Q	60-153
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	**56**	Q	65-182
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	87		70-151
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	**44**	Q	56-138
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	**49**	Q	61-147
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	**54**	Q	62-149
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	101		63-166
Perfluoro[13C8]Octanoic Acid (M8PFOA)	**59**	Q	62-152
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	50		32-182
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	65		61-154
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	96		65-151
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	65		65-150
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	64		25-186
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	**1**	Q	45-137
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	75		64-158
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	27		1-125
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	**0**	Q	42-136
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	79		56-148
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	75		26-160

Project Name: BARNSTABLE AIRPORT **Lab Number:** L2040892

Project Number: 20102 **Report Date:** 10/12/20

Method Blank Analysis
Batch Quality Control

Analytical Method: 134,LCMSMS-ID
Analytical Date: 10/08/20 13:29
Analyst: SG

Extraction Method: ALPHA 23528
Extraction Date: 10/05/20 12:45

Parameter	Result	Qualifier	Units	RL	MDL
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab for sample(s): 01,07 Batch: WG1418146-1					
Perfluorobutanoic Acid (PFBA)	ND		ng/g	1.00	0.023
Perfluoropentanoic Acid (PFPeA)	ND		ng/g	1.00	0.046
Perfluorobutanesulfonic Acid (PFBS)	ND		ng/g	1.00	0.039
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	ND		ng/g	1.00	0.065
Perfluorohexanoic Acid (PFHxA)	ND		ng/g	1.00	0.053
Perfluoropentanesulfonic Acid (PFPeS)	ND		ng/g	1.00	0.084
Perfluoroheptanoic Acid (PFHpA)	ND		ng/g	1.00	0.045
Perfluorohexanesulfonic Acid (PFHxS)	ND		ng/g	1.00	0.061
Perfluorooctanoic Acid (PFOA)	ND		ng/g	1.00	0.042
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND		ng/g	1.00	0.180
Perfluoroheptanesulfonic Acid (PFHpS)	ND		ng/g	1.00	0.136
Perfluorononanoic Acid (PFNA)	ND		ng/g	1.00	0.075
Perfluorooctanesulfonic Acid (PFOS)	ND		ng/g	1.00	0.130
Perfluorodecanoic Acid (PFDA)	ND		ng/g	1.00	0.067
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND		ng/g	1.00	0.287
Perfluorononanesulfonic Acid (PFNS)	ND		ng/g	1.00	0.299
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND		ng/g	1.00	0.202
Perfluoroundecanoic Acid (PFUnA)	ND		ng/g	1.00	0.047
Perfluorodecanesulfonic Acid (PFDS)	ND		ng/g	1.00	0.153
Perfluorooctanesulfonamide (FOSA)	ND		ng/g	1.00	0.098
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND		ng/g	1.00	0.085
Perfluorododecanoic Acid (PFDoA)	ND		ng/g	1.00	0.070
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/g	1.00	0.204
Perfluorotetradecanoic Acid (PFTA)	ND		ng/g	1.00	0.054
PFOA/PFOS, Total	ND		ng/g	1.00	0.042
PFAS, Total (5)	ND		ng/g	1.00	0.042

Project Name: BARNSTABLE AIRPORT **Lab Number:** L2040892

Project Number: 20102 **Report Date:** 10/12/20

Method Blank Analysis
Batch Quality Control

Analytical Method: 134,LCMSMS-ID
Analytical Date: 10/08/20 13:29
Analyst: SG

Extraction Method: ALPHA 23528
Extraction Date: 10/05/20 12:45

Parameter	Result	Qualifier	Units	RL	MDL
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab for sample(s): 01,07 Batch: WG1418146-1					

Surrogate (Extracted Internal Standard)	%Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	106		60-153
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	119		65-182
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	112		70-151
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	121		56-138
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	102		61-147
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	107		62-149
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	116		63-166
Perfluoro[13C8]Octanoic Acid (M8PFOA)	107		62-152
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	99		32-182
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	111		61-154
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	114		65-151
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	108		65-150
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	115		25-186
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	86		45-137
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	125		64-158
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	1		1-125
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	95		42-136
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	122		56-148
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	104		26-160

Project Name: BARNSTABLE AIRPORT **Lab Number:** L2040892

Project Number: 20102 **Report Date:** 10/12/20

Method Blank Analysis
Batch Quality Control

Analytical Method: 134,LCMSMS-ID
Analytical Date: 10/10/20 13:29
Analyst: SG

Extraction Method: EPA 537(M)
Extraction Date: 10/09/20 19:30

Parameter	Result	Qualifier	Units	RL	MDL
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab for sample(s): 04-06,08 Batch: WG1420434-1					
Perfluorobutanoic Acid (PFBA)	ND		ng/g	1.00	0.023
Perfluoropentanoic Acid (PFPeA)	ND		ng/g	1.00	0.046
Perfluorobutanesulfonic Acid (PFBS)	ND		ng/g	1.00	0.039
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	ND		ng/g	1.00	0.065
Perfluorohexanoic Acid (PFHxA)	ND		ng/g	1.00	0.053
Perfluoropentanesulfonic Acid (PFPeS)	ND		ng/g	1.00	0.084
Perfluoroheptanoic Acid (PFHpA)	ND		ng/g	1.00	0.045
Perfluorohexanesulfonic Acid (PFHxS)	ND		ng/g	1.00	0.061
Perfluorooctanoic Acid (PFOA)	ND		ng/g	1.00	0.042
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND		ng/g	1.00	0.180
Perfluoroheptanesulfonic Acid (PFHpS)	ND		ng/g	1.00	0.136
Perfluorononanoic Acid (PFNA)	ND		ng/g	1.00	0.075
Perfluorooctanesulfonic Acid (PFOS)	ND		ng/g	1.00	0.130
Perfluorodecanoic Acid (PFDA)	ND		ng/g	1.00	0.067
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND		ng/g	1.00	0.287
Perfluorononanesulfonic Acid (PFNS)	ND		ng/g	1.00	0.299
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND		ng/g	1.00	0.202
Perfluoroundecanoic Acid (PFUnA)	ND		ng/g	1.00	0.047
Perfluorodecanesulfonic Acid (PFDS)	ND		ng/g	1.00	0.153
Perfluorooctanesulfonamide (FOSA)	ND		ng/g	1.00	0.098
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND		ng/g	1.00	0.085
Perfluorododecanoic Acid (PFDoA)	ND		ng/g	1.00	0.070
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/g	1.00	0.204
Perfluorotetradecanoic Acid (PFTA)	ND		ng/g	1.00	0.054

Project Name: BARNSTABLE AIRPORT **Lab Number:** L2040892

Project Number: 20102 **Report Date:** 10/12/20

Method Blank Analysis
Batch Quality Control

Analytical Method: 134,LCMSMS-ID
Analytical Date: 10/10/20 13:29
Analyst: SG

Extraction Method: EPA 537(M)
Extraction Date: 10/09/20 19:30

Parameter	Result	Qualifier	Units	RL	MDL
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab for sample(s): 04-06,08 Batch: WG1420434-1					

Surrogate (Extracted Internal Standard)	%Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	115		60-153
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	129		65-182
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	116		70-151
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	111		56-138
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	105		61-147
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	113		62-149
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	117		63-166
Perfluoro[13C8]Octanoic Acid (M8PFOA)	117		62-152
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	109		32-182
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	121		61-154
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	117		65-151
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	116		65-150
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	123		25-186
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	96		45-137
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	138		64-158
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	29		1-125
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	86		42-136
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	116		56-148
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	122		26-160

Lab Control Sample Analysis
Batch Quality Control

Project Name: BARNSTABLE AIRPORT
Project Number: 20102

Lab Number: L2040892
Report Date: 10/12/20

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01,07 Batch: WG1418146-2 WG1418146-3								
Perfluorobutanoic Acid (PFBA)	100		100		71-135	0		30
Perfluoropentanoic Acid (PFPeA)	100		102		69-132	2		30
Perfluorobutanesulfonic Acid (PFBS)	100		100		72-128	0		30
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	114		115		62-145	1		30
Perfluorohexanoic Acid (PFHxA)	104		105		70-132	1		30
Perfluoropentanesulfonic Acid (PFPeS)	93		97		73-123	4		30
Perfluoroheptanoic Acid (PFHpA)	101		100		71-131	1		30
Perfluorohexanesulfonic Acid (PFHxS)	80		85		67-130	6		30
Perfluorooctanoic Acid (PFOA)	102		103		69-133	1		30
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	107		104		64-140	3		30
Perfluoroheptanesulfonic Acid (PFHpS)	96		96		70-132	0		30
Perfluorononanoic Acid (PFNA)	100		101		72-129	1		30
Perfluorooctanesulfonic Acid (PFOS)	100		100		68-136	0		30
Perfluorodecanoic Acid (PFDA)	109		102		69-133	7		30
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	108		109		65-137	1		30
Perfluorononanesulfonic Acid (PFNS)	107		101		69-125	6		30
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	119		130		63-144	9		30
Perfluoroundecanoic Acid (PFUnA)	97		99		64-136	2		30
Perfluorodecanesulfonic Acid (PFDS)	106		103		59-134	3		30
Perfluorooctanesulfonamide (FOSA)	106		80		67-137	28		30
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	114		108		61-139	5		30
Perfluorododecanoic Acid (PFDoA)	89		90		69-135	1		30

Lab Control Sample Analysis

Batch Quality Control

Project Name: BARNSTABLE AIRPORT

Project Number: 20102

Lab Number: L2040892

Report Date: 10/12/20

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01,07 Batch: WG1418146-2 WG1418146-3								
Perfluorotridecanoic Acid (PFTrDA)	104		109		66-139	5		30
Perfluorotetradecanoic Acid (PFTA)	102		99		69-133	3		30

Surrogate (Extracted Internal Standard)	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	109		106		60-153
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	120		117		65-182
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	108		106		70-151
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	116		114		56-138
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	102		98		61-147
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	109		104		62-149
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	114		107		63-166
Perfluoro[13C8]Octanoic Acid (M8PFOA)	109		106		62-152
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	99		101		32-182
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	112		108		61-154
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	111		112		65-151
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	107		108		65-150
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	98		108		25-186
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	82		79		45-137
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	125		125		64-158
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	26		3		1-125
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	91		98		42-136
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	115		112		56-148
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	104		104		26-160

Lab Control Sample Analysis
Batch Quality Control

Project Name: BARNSTABLE AIRPORT
Project Number: 20102

Lab Number: L2040892
Report Date: 10/12/20

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 04-06,08 Batch: WG1420434-2 WG1420434-3								
Perfluorobutanoic Acid (PFBA)	100		100		71-135	0		30
Perfluoropentanoic Acid (PFPeA)	101		100		69-132	1		30
Perfluorobutanesulfonic Acid (PFBS)	96		95		72-128	1		30
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	109		114		62-145	4		30
Perfluorohexanoic Acid (PFHxA)	100		99		70-132	1		30
Perfluoropentanesulfonic Acid (PFPeS)	90		86		73-123	5		30
Perfluoroheptanoic Acid (PFHpA)	98		98		71-131	0		30
Perfluorohexanesulfonic Acid (PFHxS)	98		94		67-130	4		30
Perfluorooctanoic Acid (PFOA)	98		96		69-133	2		30
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	111		110		64-140	1		30
Perfluoroheptanesulfonic Acid (PFHpS)	99		102		70-132	3		30
Perfluorononanoic Acid (PFNA)	100		102		72-129	2		30
Perfluorooctanesulfonic Acid (PFOS)	102		105		68-136	3		30
Perfluorodecanoic Acid (PFDA)	97		96		69-133	1		30
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	106		101		65-137	5		30
Perfluorononanesulfonic Acid (PFNS)	114		113		69-125	1		30
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	88		90		63-144	2		30
Perfluoroundecanoic Acid (PFUnA)	104		102		64-136	2		30
Perfluorodecanesulfonic Acid (PFDS)	121		117		59-134	3		30
Perfluorooctanesulfonamide (FOSA)	99		97		67-137	2		30
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	97		101		61-139	4		30
Perfluorododecanoic Acid (PFDoA)	102		101		69-135	1		30

Lab Control Sample Analysis

Batch Quality Control

Project Name: BARNSTABLE AIRPORT

Project Number: 20102

Lab Number: L2040892

Report Date: 10/12/20

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 04-06,08 Batch: WG1420434-2 WG1420434-3								
Perfluorotridecanoic Acid (PFTrDA)	92		95		66-139	3		30
Perfluorotetradecanoic Acid (PFTA)	109		105		69-133	4		30

Surrogate (Extracted Internal Standard)	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	102		98		60-153
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	98		94		65-182
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	107		105		70-151
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	99		93		56-138
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	103		101		61-147
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	110		108		62-149
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	115		116		63-166
Perfluoro[13C8]Octanoic Acid (M8PFOA)	106		105		62-152
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	107		109		32-182
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	112		108		61-154
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	110		104		65-151
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	104		104		65-150
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	116		114		25-186
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	81		78		45-137
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	111		107		64-158
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	32		14		1-125
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	78		78		42-136
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	101		97		56-148
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	70		70		26-160

Matrix Spike Analysis
Batch Quality Control

Project Name: BARNSTABLE AIRPORT
Project Number: 20102
Lab Number: L2040892
Report Date: 10/12/20

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab DL22(2-4)	Associated sample(s): 01,07		QC Batch ID: WG1418146-4			QC Sample: L2040892-01			Client ID:			
Perfluorobutanoic Acid (PFBA)	0.076J	4.45	4.46	100		-	-		71-135	-		30
Perfluoropentanoic Acid (PFPeA)	0.151J	4.45	4.52	102		-	-		69-132	-		30
Perfluorobutanesulfonic Acid (PFBS)	ND	3.95	3.96	100		-	-		72-128	-		30
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	ND	4.17	4.30	103		-	-		62-145	-		30
Perfluorohexanoic Acid (PFHxA)	0.116JF	4.45	4.60	103		-	-		70-132	-		30
Perfluoropentanesulfonic Acid (PFPeS)	ND	4.18	3.82	91		-	-		73-123	-		30
Perfluoroheptanoic Acid (PFHpA)	0.109J	4.45	4.50	101		-	-		71-131	-		30
Perfluorohexanesulfonic Acid (PFHxS)	ND	4.07	3.33	82		-	-		67-130	-		30
Perfluorooctanoic Acid (PFOA)	0.447J	4.45	4.96	111		-	-		69-133	-		30
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	7.49	4.24	12.1	109		-	-		64-140	-		30
Perfluoroheptanesulfonic Acid (PFHpS)	ND	4.24	4.30	101		-	-		70-132	-		30
Perfluorononanoic Acid (PFNA)	5.46	4.45	9.98	102		-	-		72-129	-		30
Perfluorooctanesulfonic Acid (PFOS)	20.3	4.13	24.6	104		-	-		68-136	-		30
Perfluorodecanoic Acid (PFDA)	0.834J	4.45	5.50	124		-	-		69-133	-		30
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	31.6	4.27	32.0	**9**	Q	-	-		65-137	-		30
Perfluorononanesulfonic Acid (PFNS)	ND	4.28	4.48	105		-	-		69-125	-		30
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND	4.45	6.07	136		-	-		63-144	-		30
Perfluoroundecanoic Acid (PFUnA)	0.230J	4.45	4.71	106		-	-		64-136	-		30
Perfluorodecanesulfonic Acid (PFDS)	ND	4.29	4.40	103		-	-		59-134	-		30
Perfluorooctanesulfonamide (FOSA)	ND	4.45	4.35	98		-	-		67-137	-		30
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND	4.45	4.55	102		-	-		61-139	-		30
Perfluorododecanoic Acid (PFDoA)	ND	4.45	4.21	95		-	-		69-135	-		30

Matrix Spike Analysis

Batch Quality Control

Project Name: BARNSTABLE AIRPORT

Project Number: 20102

Lab Number: L2040892

Report Date: 10/12/20

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01,07 QC Batch ID: WG1418146-4 QC Sample: L2040892-01 Client ID: DL22(2-4)												
Perfluorotridecanoic Acid (PFTrDA)	ND	4.45	4.26	96		-	-		66-139	-		30
Perfluorotetradecanoic Acid (PFTA)	ND	4.45	4.30	97		-	-		69-133	-		30

Surrogate (Extracted Internal Standard)	MS % Recovery	MS Qualifier	MSD % Recovery	MSD Qualifier	Acceptance Criteria
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	97				25-186
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	91				56-138
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	80				32-182
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	**6**	Q			42-136
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	**5**	Q			45-137
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	92				64-158
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	80				65-150
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	72				61-147
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	79				62-149
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	95				63-166
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	85				56-148
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	53				26-160
Perfluoro[13C4]Butanoic Acid (MPFBA)	76				60-153
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	87				65-182
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	22				1-125
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	90				65-151
Perfluoro[13C8]Octanoic Acid (M8PFOA)	80				62-152
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	81				61-154
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	90				70-151

INORGANICS
&
MISCELLANEOUS

Project Name: BARNSTABLE AIRPORT
Project Number: 20102
Lab Number: L2040892
Report Date: 10/12/20

SAMPLE RESULTS

Lab ID: L2040892-01
Client ID: DL22(2-4)
Sample Location: HYANNIS MA
Sample Depth:
Matrix: Soil

Date Collected: 09/25/20 12:45
Date Received: 09/28/20
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Mansfield Lab										
Solids, Total	98.1		%	0.100	0.100	1	-	09/30/20 10:18	121,2540G	JW

Project Name: BARNSTABLE AIRPORT
Lab Number: L2040892
Project Number: 20102
Report Date: 10/12/20

SAMPLE RESULTS

Lab ID: L2040892-02
Client ID: DL22(6-8)
Sample Location: HYANNIS MA
Date Collected: 09/25/20 12:51
Date Received: 09/28/20
Field Prep: Not Specified

Sample Depth:
Matrix: Soil

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Mansfield Lab										
Solids, Total	96.6		%	0.100	0.100	1	-	09/30/20 10:18	121,2540G	JW

Project Name: BARNSTABLE AIRPORT
Project Number: 20102
Lab Number: L2040892
Report Date: 10/12/20

SAMPLE RESULTS

Lab ID: L2040892-03
Client ID: DL22(18-20)
Sample Location: HYANNIS MA
Sample Depth:
Matrix: Soil

Date Collected: 09/25/20 12:57
Date Received: 09/28/20
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Mansfield Lab										
Solids, Total	98.2		%	0.100	0.100	1	-	09/30/20 10:18	121,2540G	JW

Project Name: BARNSTABLE AIRPORT
Project Number: 20102
Lab Number: L2040892
Report Date: 10/12/20

SAMPLE RESULTS

Lab ID: L2040892-04
Client ID: DL19(0-1)
Sample Location: HYANNIS MA
Sample Depth:
Matrix: Soil

Date Collected: 09/25/20 13:27
Date Received: 09/28/20
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Mansfield Lab										
Solids, Total	95.7		%	0.100	0.100	1	-	09/30/20 10:18	121,2540G	JW

Project Name: BARNSTABLE AIRPORT
Project Number: 20102
Lab Number: L2040892
Report Date: 10/12/20

SAMPLE RESULTS

Lab ID: L2040892-05
Client ID: DL20(0-1)
Sample Location: HYANNIS MA
Sample Depth:
Matrix: Soil

Date Collected: 09/25/20 13:34
Date Received: 09/28/20
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Mansfield Lab										
Solids, Total	95.0		%	0.100	0.100	1	-	09/30/20 10:18	121,2540G	JW

Project Name: BARNSTABLE AIRPORT
Project Number: 20102
Lab Number: L2040892
Report Date: 10/12/20

SAMPLE RESULTS

Lab ID: L2040892-06
Client ID: DL21(0-1)
Sample Location: HYANNIS MA
Sample Depth:
Matrix: Soil

Date Collected: 09/25/20 13:40
Date Received: 09/28/20
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Mansfield Lab										
Solids, Total	95.1		%	0.100	0.100	1	-	09/30/20 10:18	121,2540G	JW

Project Name: BARNSTABLE AIRPORT
Project Number: 20102
Lab Number: L2040892
Report Date: 10/12/20

SAMPLE RESULTS

Lab ID: L2040892-07
Client ID: DL18(0-1)
Sample Location: HYANNIS MA
Sample Depth:
Matrix: Soil

Date Collected: 09/25/20 15:00
Date Received: 09/28/20
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Mansfield Lab										
Solids, Total	86.0		%	0.100	0.100	1	-	09/30/20 10:18	121,2540G	JW

Project Name: BARNSTABLE AIRPORT
Project Number: 20102
Lab Number: L2040892
Report Date: 10/12/20

SAMPLE RESULTS

Lab ID: L2040892-08
Client ID: DL17(0-1)
Sample Location: HYANNIS MA
Sample Depth:
Matrix: Soil

Date Collected: 09/25/20 15:15
Date Received: 09/28/20
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Mansfield Lab										
Solids, Total	95.7		%	0.100	0.100	1	-	09/30/20 10:18	121,2540G	JW

Project Name: BARNSTABLE AIRPORT
Project Number: 20102

Lab Number: L2040892
Report Date: 10/12/20

Sample Receipt and Container Information

Were project specific reporting limits specified? YES

Cooler Information

Cooler	Custody Seal
A	Absent

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L2040892-01A	Plastic 8oz unpreserved	A	NA		2.4	Y	Absent		A2-537-ISOTOPE(14)
L2040892-01B	Plastic 2oz unpreserved for TS	A	NA		2.4	Y	Absent		A2-TS(7)
L2040892-02A	Plastic 8oz unpreserved	A	NA		2.4	Y	Absent		A2-S-EXT-537(28)
L2040892-02B	Plastic 2oz unpreserved for TS	A	NA		2.4	Y	Absent		A2-TS(7)
L2040892-03A	Plastic 8oz unpreserved	A	NA		2.4	Y	Absent		A2-S-EXT-537(28)
L2040892-03B	Plastic 2oz unpreserved for TS	A	NA		2.4	Y	Absent		A2-TS(7)
L2040892-04A	Plastic 8oz unpreserved	A	NA		2.4	Y	Absent		A2-537-ISOTOPE(14)
L2040892-04B	Plastic 2oz unpreserved for TS	A	NA		2.4	Y	Absent		A2-TS(7)
L2040892-05A	Plastic 8oz unpreserved	A	NA		2.4	Y	Absent		A2-537-ISOTOPE(14)
L2040892-05B	Plastic 2oz unpreserved for TS	A	NA		2.4	Y	Absent		A2-TS(7)
L2040892-06A	Plastic 8oz unpreserved	A	NA		2.4	Y	Absent		A2-537-ISOTOPE(14)
L2040892-06B	Plastic 2oz unpreserved for TS	A	NA		2.4	Y	Absent		A2-TS(7)
L2040892-07A	Plastic 8oz unpreserved	A	NA		2.4	Y	Absent		A2-537-ISOTOPE(14)
L2040892-07B	Plastic 2oz unpreserved for TS	A	NA		2.4	Y	Absent		A2-TS(7)
L2040892-08A	Plastic 8oz unpreserved	A	NA		2.4	Y	Absent		A2-537-ISOTOPE(14)
L2040892-08B	Plastic 2oz unpreserved for TS	A	NA		2.4	Y	Absent		A2-TS(7)

*Values in parentheses indicate holding time in days

Project Name: BARNSTABLE AIRPORT
Project Number: 20102
Lab Number: L2040892
Report Date: 10/12/20

PFAS PARAMETER SUMMARY

Parameter	Acronym	CAS Number
PERFLUOROALKYL CARBOXYLIC ACIDS (PFCAs)		
Perfluorooctadecanoic Acid	PFODA	16517-11-6
Perfluorohexadecanoic Acid	PFHxDA	67905-19-5
Perfluorotetradecanoic Acid	PFTA	376-06-7
Perfluorotridecanoic Acid	PFTrDA	72629-94-8
Perfluorododecanoic Acid	PFDoA	307-55-1
Perfluoroundecanoic Acid	PFUnA	2058-94-8
Perfluorodecanoic Acid	PFDA	335-76-2
Perfluorononanoic Acid	PFNA	375-95-1
Perfluorooctanoic Acid	PFOA	335-67-1
Perfluoroheptanoic Acid	PFHpA	375-85-9
Perfluorohexanoic Acid	PFHxA	307-24-4
Perfluoropentanoic Acid	PFPeA	2706-90-3
Perfluorobutanoic Acid	PFBA	375-22-4
PERFLUOROALKYL SULFONIC ACIDS (PFSAs)		
Perfluorododecanesulfonic Acid	PFDoDS	79780-39-5
Perfluorodecanesulfonic Acid	PFDS	335-77-3
Perfluorononanesulfonic Acid	PFNS	68259-12-1
Perfluorooctanesulfonic Acid	PFOS	1763-23-1
Perfluoroheptanesulfonic Acid	PFHpS	375-92-8
Perfluorohexanesulfonic Acid	PFHxS	355-46-4
Perfluoropentanesulfonic Acid	PFPeS	2706-91-4
Perfluorobutanesulfonic Acid	PFBS	375-73-5
FLUOROTELOMERS		
1H,1H,2H,2H-Perfluorododecanesulfonic Acid	10:2FTS	120226-60-0
1H,1H,2H,2H-Perfluorodecanesulfonic Acid	8:2FTS	39108-34-4
1H,1H,2H,2H-Perfluorooctanesulfonic Acid	6:2FTS	27619-97-2
1H,1H,2H,2H-Perfluorohexanesulfonic Acid	4:2FTS	757124-72-4
PERFLUOROALKANE SULFONAMIDES (FASAs)		
Perfluorooctanesulfonamide	FOSA	754-91-6
N-Ethyl Perfluorooctane Sulfonamide	NEtFOSA	4151-50-2
N-Methyl Perfluorooctane Sulfonamide	NMeFOSA	31506-32-8
PERFLUOROALKANE SULFONYL SUBSTANCES		
N-Ethyl Perfluorooctanesulfonamido Ethanol	NEtFOSE	1691-99-2
N-Methyl Perfluorooctanesulfonamido Ethanol	NMeFOSE	24448-09-7
N-Ethyl Perfluorooctanesulfonamidoacetic Acid	NEtFOSAA	2991-50-6
N-Methyl Perfluorooctanesulfonamidoacetic Acid	NMeFOSAA	2355-31-9
PER- and POLYFLUOROALKYL ETHER CARBOXYLIC ACIDS		
2,3,3,3-Tetrafluoro-2-[1,1,2,2,3,3,3-Heptafluoropropoxy]-Propanoic Acid	HFPO-DA	13252-13-6
4,8-Dioxa-3h-Perfluorononanoic Acid	ADONA	919005-14-4
CHLORO-PERFLUOROALKYL SULFONIC ACIDS		
11-Chloroeicosafluoro-3-Oxaundecane-1-Sulfonic Acid	11Cl-PF3OUdS	763051-92-9
9-Chlorohexadecafluoro-3-Oxanone-1-Sulfonic Acid	9Cl-PF3ONS	756426-58-1
PERFLUOROETHER SULFONIC ACIDS (PFESAs)		
Perfluoro(2-Ethoxyethane)Sulfonic Acid	PFEESA	113507-82-7
PERFLUOROETHER/POLYETHER CARBOXYLIC ACIDS (PFPCAs)		
Perfluoro-3-Methoxypropanoic Acid	PFMPA	377-73-1
Perfluoro-4-Methoxybutanoic Acid	PFMBA	863090-89-5
Nonafluoro-3,6-Dioxaheptanoic Acid	NFDHA	151772-58-6

Project Name:	BARNSTABLE AIRPORT	**Lab Number:**	L2040892
Project Number:	20102	**Report Date:**	10/12/20

GLOSSARY

Acronyms

DL - Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the limit of quantitation (LOQ). The DL includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

EDL - Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).

EMPC - Estimated Maximum Possible Concentration: The concentration that results from the signal present at the retention time of an analyte when the ions meet all of the identification criteria except the ion abundance ratio criteria. An EMPC is a worst-case estimate of the concentration.

EPA - Environmental Protection Agency.

LCS - Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

LCSD - Laboratory Control Sample Duplicate: Refer to LCS.

LFB - Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

LOD - Limit of Detection: This value represents the level to which a target analyte can reliably be detected for a specific analyte in a specific matrix by a specific method. The LOD includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

LOQ - Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

MDL - Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

MS - Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available. For Method 332.0, the spike recovery is calculated using the native concentration, including estimated values.

MSD - Matrix Spike Sample Duplicate: Refer to MS.

NA - Not Applicable.

NC - Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.

NDPA/DPA - N-Nitrosodiphenylamine/Diphenylamine.

NI - Not Ignitable.

NP - Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.

NR - No Results: Term is utilized when 'No Target Compounds Requested' is reported for the analysis of Volatile or Semivolatile Organic TIC only requests.

RL - Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

RPD - Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.

SRM - Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.

STLP - Semi-dynamic Tank Leaching Procedure per EPA Method 1315.

TEF - Toxic Equivalency Factors: The values assigned to each dioxin and furan to evaluate their toxicity relative to 2,3,7,8-TCDD.

TEQ - Toxic Equivalent: The measure of a sample's toxicity derived by multiplying each dioxin and furan by its corresponding TEF and then summing the resulting values.

TIC - Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

Report Format: DU Report with 'J' Qualifiers

Project Name:	BARNSTABLE AIRPORT	**Lab Number:**	L2040892
Project Number:	20102	**Report Date:**	10/12/20

Footnotes

1 - The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

Terms

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

Difference: With respect to Total Oxidizable Precursor (TOP) Assay analysis, the difference is defined as the Post-Treatment value minus the Pre-Treatment value.

Final pH: As it pertains to Sample Receipt & Container Information section of the report, Final pH reflects pH of container determined after adjustment at the laboratory, if applicable. If no adjustment required, value reflects Initial pH.

Frozen Date/Time: With respect to Volatile Organics in soil, Frozen Date/Time reflects the date/time at which associated Reagent Water-preserved vials were initially frozen. Note: If frozen date/time is beyond 48 hours from sample collection, value will be reflected in 'bold'.

Initial pH: As it pertains to Sample Receipt & Container Information section of the report, Initial pH reflects pH of container determined upon receipt, if applicable.

PAH Total: With respect to Alkylated PAH analyses, the 'PAHs, Total' result is defined as the summation of results for all or a subset of the following compounds: Naphthalene, C1-C4 Naphthalenes, 2-Methylnaphthalene, 1-Methylnaphthalene, Biphenyl, Acenaphthylene, Acenaphthene, Fluorene, C1-C3 Fluorenes, Phenanthrene, C1-C4 Phenanthrenes/Anthracenes, Anthracene, Fluoranthene, Pyrene, C1-C4 Fluoranthenes/Pyrenes, Benz(a)anthracene, Chrysene, C1-C4 Chrysenes, Benzo(b)fluoranthene, Benzo(j)+(k)fluoranthene, Benzo(e)pyrene, Benzo(a)pyrene, Perylene, Indeno(1,2,3-cd)pyrene, Dibenz(ah)+(ac)anthracene, Benzo(g,h,i)perylene. If a 'Total' result is requested, the results of its individual components will also be reported.

PFAS Total: With respect to PFAS analyses, the 'PFAS, Total (5)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA and PFOS. If a 'Total' result is requested, the results of its individual components will also be reported.

The target compound Chlordane (CAS No. 57-74-9) is reported for GC ECD analyses. Per EPA,this compound "refers to a mixture of chlordane isomers, other chlorinated hydrocarbons and numerous other components." (Reference: USEPA Toxicological Review of Chlordane, In Support of Summary Information on the Integrated Risk Information System (IRIS), December 1997.)

Total: With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

Data Qualifiers

A - Spectra identified as "Aldol Condensates" are byproducts of the extraction/concentration procedures when acetone is introduced in the process.

B - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).

C - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.

D - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.

E - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

F - The ratio of quantifier ion response to qualifier ion response falls outside of the laboratory criteria. Results are considered to be an estimated maximum concentration.

G - The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.

H - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.

I - The lower value for the two columns has been reported due to obvious interference.

J - Estimated value. The Target analyte concentration is below the quantitation limit (RL), but above the Method Detection Limit (MDL) or Estimated Detection Limit (EDL) for SPME-related analyses. This represents an estimated concentration for Tentatively Identified Compounds (TICs).

M - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.

ND - Not detected at the method detection limit (MDL) for the sample, or estimated detection limit (EDL) for SPME-related analyses.

NJ - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where

Report Format: DU Report with 'J' Qualifiers

Project Name:	BARNSTABLE AIRPORT	**Lab Number:**	L2040892
Project Number:	20102	**Report Date:**	10/12/20

Data Qualifiers

the identification is based on a mass spectral library search.

P - The RPD between the results for the two columns exceeds the method-specified criteria.

Q - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)

R - Analytical results are from sample re-analysis.

RE - Analytical results are from sample re-extraction.

S - Analytical results are from modified screening analysis.

Project Name: BARNSTABLE AIRPORT **Lab Number:** L2040892

Project Number: 20102 **Report Date:** 10/12/20

REFERENCES

121 Standard Methods for the Examination of Water and Wastewater. APHA-AWWA-WEF. Standard Methods Online.

134 Determination of Selected Perfluorinated Alkyl Acids in Drinking Water by Solid Phase Extraction and Liquid Chromatography/Tandem Mass Spectrometry (LC/MS/MS) using Isotope Dilution. Alpha SOP 23528.

LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.

Certification Information

The following analytes are not included in our Primary NELAP Scope of Accreditation:

Westborough Facility
EPA 624/624.1: m/p-xylene, o-xylene, Naphthalene
EPA 8260C: NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene; SCM: Iodomethane (methyl iodide), 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.
EPA 8270D: NPW: Dimethylnaphthalene,1,4-Diphenylhydrazine; SCM: Dimethylnaphthalene,1,4-Diphenylhydrazine.
SM4500: NPW: Amenable Cyanide; SCM: Total Phosphorus, TKN, NO2, NO3.

Mansfield Facility
SM 2540D: TSS
EPA 8082A: NPW: PCB: 1, 5, 31, 87,101, 110, 141, 151, 153, 180, 183, 187.
EPA TO-15: Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.
EPA TO-12 Non-methane organics
EPA 3C Fixed gases
Biological Tissue Matrix: EPA 3050B

The following analytes are included in our Massachusetts DEP Scope of Accreditation

Westborough Facility:

Drinking Water
EPA 300.0: Chloride, Nitrate-N, Fluoride, Sulfate; **EPA 353.2**: Nitrate-N, Nitrite-N; **SM4500NO3-F**: Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500Cl-D, SM2320B, SM2540C, SM4500H-B, SM4500NO2-B**
EPA 332: Perchlorate; **EPA 524.2:** THMs and VOCs; **EPA 504.1:** EDB, DBCP.
Microbiology: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT,SM9222D**.

Non-Potable Water
SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2320B, SM4500CL-E, SM4500F-BC, SM4500NH3-BH: Ammonia-N and Kjeldahl-N, **EPA 350.1**: Ammonia-N, **LACHAT 10-107-06-1-B**: Ammonia-N, **EPA 351.1, SM4500NO3-F, EPA 353.2**: Nitrate-N**, SM4500P-E, SM4500P-B, E, SM4500SO4-E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, EPA 420.1, SM4500-CN-CE, SM2540D, EPA 300: Chloride, Sulfate, Nitrate.**
EPA 624.1: Volatile Halocarbons & Aromatics,
EPA 608.3: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs
EPA 625.1: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045**: PCB-Oil.
Microbiology: **SM9223B-Colilert-QT; Enterolert-QT, SM9221E, EPA 1600, EPA 1603.**

Mansfield Facility:

Drinking Water
EPA 200.7: Al, Ba, Cd, Cr, Cu, Fe, Mn, Ni, Na, Ag, Ca, Zn. **EPA 200.8:** Al, Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Mn, Ni, Se, Ag, TL, Zn. **EPA 245.1** Hg.
EPA 522.

Non-Potable Water
EPA 200.7: Al, Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Sr, TL, Ti, V, Zn.
EPA 200.8: Al, Sb**,** As, Be, Cd, Cr, Cu, Fe, Pb, Mn, Ni, K, Se, Ag, Na, TL, Zn.
EPA 245.1 Hg.
SM2340B

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

CHAIN OF CUSTODY

PAGE 1 OF 1

Date Rec'd in Lab: 9/28/20

ALPHA Job #: L2040892

ALPHA
WESTBORO, MA TEL: 508-898-9220 FAX: 508-898-9193
MANSFIELD, MA TEL: 508-822-9300 FAX: 508-822-3288

Client Information

Client: Horsley Witten Group
Address: 90 Route 6A
Sandwich MA 02563
Phone: (508)
Fax:
Email: bmassa@horsleywitten.com
☐ These samples have been previously analyzed by Alpha

Project Information

Project Name: Barnstable Airport
Project Location: Hyannis MA
Project #: 20102
Project Manager: Bryan massa
ALPHA Quote #:

Turn-Around Time

☑ Standard ☐ RUSH (only confirmed if pre-approved)
Date Due: Time:

Report Information - Data Deliverables

☐ FAX ☐ EMAIL
☐ ADEx ☐ Add'l Deliverables

Billing Information

☐ Same as Client info PO #:

Regulatory Requirements/Report Limits

State /Fed Program | Criteria

Other Project Specific Requirements/Comments/Detection Limits:

ANALYSIS: PFAS ISO type Dilution PFAS ISOTOPE DILUTION EXTRACTABLE HOLD

SAMPLE HANDLING

Filtration
☐ Done
☐ Not needed
☐ Lab to do
Preservation
☐ Lab to do
(Please specify below)

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler's Initials	Sample Specific Comments	TOTAL # BOTTLES
L2040892-01	DL22 (2-4)	9/25/20	12:45	Soil	SB	✓	
-02	DL22 (6-8)	9/25/20	12:51	Soil	SB	✓	
-03	DL22 (18-20)	9/25/20	12:57	Soil	SB	✓	
-04	DL19 (0-1)	9/25/20	13:27	Soil	SB	✓ SB	
-05	DL20 (0-1)	9/25/20	13:34	Soil	SB	✓	
-06	DL21 (0-1)	9/25/20	13:40	Soil	SB	✓	
-07	DL18 (0-1)	9/25/20	15:00	Soil	SB	✓	
-08	DL17 (0-1)	9/25/20	15:15	Soil	SB	✓	

Container Type	
Preservative	

Relinquished By:	Date/Time	Received By:	Date/Time
Brian Kelly TGY, AA	9/28/20 13:30	TGY, AA	9/28/20 1336
	9/28/20 2040		9/28/20 1740
	9/28/20 2050		9/28/20 2050

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. All samples submitted are subject to Alpha's Terms and Conditions. See reverse side.

ANALYTICAL REPORT

Lab Number:	L2040723
Client:	Horseley & Witten, Inc. Sextant Hill Office Park 90 Route 6A Sandwich, MA 02563
ATTN:	Brian Massa
Phone:	(508) 833-6600
Project Name:	BARNSTABLE AIRPORT
Project Number:	20102
Report Date:	10/08/20

The original project report/data package is held by Alpha Analytical. This report/data package is paginated and should be reproduced only in its entirety. Alpha Analytical holds no responsibility for results and/or data that are not consistent with the original.

Certifications & Approvals: MA (M-MA030), NH NELAP (2062), CT (PH-0141), DoD (L2474), FL (E87814), IL (200081), LA (85084), ME (MA00030), MD (350), NJ (MA015), NY (11627), NC (685), OH (CL106), PA (68-02089), RI (LAO00299), TX (T104704419), VT (VT-0015), VA (460194), WA (C954), US Army Corps of Engineers, USDA (Permit #P330-17-00150), USFWS (Permit #206964).

320 Forbes Boulevard, Mansfield, MA 02048-1806
508-822-9300 (Fax) 508-822-3288 800-624-9220 - www.alphalab.com

Project Name: BARNSTABLE AIRPORT
Project Number: 20102

Lab Number: L2040723
Report Date: 10/08/20

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L2040723-01	A5 (12-14)	SOIL	HYANNIS MA	09/24/20 09:46	09/25/20
L2040723-02	A5 (18-20)	SOIL	HYANNIS MA	09/24/20 09:57	09/25/20
L2040723-03	A20 (0-1)	SOIL	HYANNIS MA	09/24/20 11:05	09/25/20
L2040723-04	A20 (2-4)	SOIL	HYANNIS MA	09/24/20 11:11	09/25/20
L2040723-05	A21 (0-1)	SOIL	HYANNIS MA	09/24/20 11:20	09/25/20
L2040723-06	A19 (0-1)	SOIL	HYANNIS MA	09/24/20 11:35	09/25/20
L2040723-07	AS5 (2-4)	SOIL	HYANNIS MA	09/24/20 11:50	09/25/20

Project Name: BARNSTABLE AIRPORT **Lab Number:** L2040723

Project Number: 20102 **Report Date:** 10/08/20

MADEP MCP Response Action Analytical Report Certification

This form provides certifications for all samples performed by MCP methods. Please refer to the Sample Results and Container Information sections of this report for specification of MCP methods used for each analysis. The following questions pertain only to MCP Analytical Methods.

An affirmative response to questions A through F is required for "Presumptive Certainty" status		
A	Were all samples received in a condition consistent with those described on the Chain-of-Custody, properly preserved (including temperature) in the field or laboratory, and prepared/analyzed within method holding times?	YES
B	Were the analytical method(s) and all associated QC requirements specified in the selected CAM protocol(s) followed?	N/A
C	Were all required corrective actions and analytical response actions specified in the selected CAM protocol(s) implemented for all identified performance standard non-conformances?	N/A
D	Does the laboratory report comply with all the reporting requirements specified in CAM VII A, "Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data?"	YES
E a.	VPH, EPH, and APH Methods only: Was each method conducted without significant modification(s)? (Refer to the individual method(s) for a list of significant modifications).	N/A
E b.	APH and TO-15 Methods only: Was the complete analyte list reported for each method?	N/A
F	Were all applicable CAM protocol QC and performance standard non-conformances identified and evaluated in a laboratory narrative (including all "No" responses to Questions A through E)?	YES

A response to questions G, H and I is required for "Presumptive Certainty" status		
G	Were the reporting limits at or below all CAM reporting limits specified in the selected CAM protocol(s)?	N/A
H	Were all QC performance standards specified in the CAM protocol(s) achieved?	N/A
I	Were results reported for the complete analyte list specified in the selected CAM protocol(s)?	N/A

For any questions answered "No", please refer to the case narrative section on the following page(s).

Please note that sample matrix information is located in the Sample Results section of this report.

Project Name:	BARNSTABLE AIRPORT	**Lab Number:**	L2040723
Project Number:	20102	**Report Date:**	10/08/20

Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet NELAP requirements for all NELAP accredited parameters unless otherwise noted in the following narrative. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively.

When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances, the specific failure is not narrated but noted in the associated QC Outlier Summary Report, located directly after the Case Narrative. QC information is also incorporated in the Data Usability Assessment table (Format 11) of our Data Merger tool, where it can be reviewed in conjunction with the sample result, associated regulatory criteria and any associated data usability implications.

Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

HOLD POLICY - For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Alpha Project Manager and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Project Management at 800-624-9220 with any questions.

Project Name:	BARNSTABLE AIRPORT	**Lab Number:**	L2040723
Project Number:	20102	**Report Date:**	10/08/20

Case Narrative (continued)

Report Submission

All non-detect (ND) or estimated concentrations (J-qualified) have been quantitated to the limit noted in the MDL column.

MCP Related Narratives

All MCP required questions were answered with affirmative responses where applicable; therefore, there are no relevant protocol-specific QC and/or performance standard non-conformances to report.

Non-MCP Related Narratives

Perfluorinated Alkyl Acids by Isotope Dilution

L2040723-03RE, -04RE, and -07RE: Extracted Internal Standard recoveries were outside the acceptance criteria for individual analytes. Please refer to the surrogate section of the report for details.

L2040723-03RE, -04RE, and -07RE: The samples were re-extracted within holding time due to QC failures in the original extraction. The results of the re-extraction are reported.

L2040723-03RE and -04RE: The reporting limit was elevated for NMeFOSAA and NEtFOSAA due to low recovery of the extracted internal standard d3.NMeFOSAA and d5-NEtFOSAA. The low recovery was attributed to the sample matrix.

L2040723-03RE, -04RE, and -07RE: The samples have elevated detection limits due to the limited sample volume utilized during extraction, as required by the sample matrix.

L2040723-05 and -06: Extracted Internal Standard recoveries were outside the acceptance criteria for individual analytes. Please refer to the surrogate section of the report for details.

L2040723-05 and -06: The reporting limit was elevated for NMeFOSAA and NEtFOSAA due to low recovery of the extracted internal standard d3-NMeFOSAA and d5-NEtFOSAA. The low recovery was attributed to the sample matrix.

L2040723-07RE: The reporting limit was elevated for NMeFOSAA and NEtFOSAA due to low recovery of the extracted internal standard d3-NMeFOSAA and d5-NEtFOSAA. The low recovery was attributed to the sample matrix.

Project Name:	BARNSTABLE AIRPORT	**Lab Number:**	L2040723
Project Number:	20102	**Report Date:**	10/08/20

Case Narrative (continued)

WG1416277-1, WG1416277-2, WG1416277-3, WG1417013-1, WG1417013-2, and WG1417013-3:
Extracted Internal Standard recoveries were outside the acceptance criteria for individual analytes. Please refer to the surrogate section of the report for details.
WG1416277-1: The reporting limit was elevated for Perfluorooctanesulfonamide (FOSA) due to low recovery of the extracted internal standard Perfluoro[13C8]Octanesulfonamide (M8FOSA). Please note that the Perfluorooctanesulfonamide (FOSA) reporting limit was also raised for all associated samples.
WG1417013-1: The reporting limit was elevated for Perfluorooctanesulfonamide (FOSA) due to low recovery of the extracted internal standard Perfluoro[13C8]Octanesulfonamide (M8FOSA). Please note that the Perfluorooctanesulfonamide (FOSA) reporting limit was also raised for all associated samples.
The WG1417013-2 LCS recovery, associated with L2040723-03, -04, and -07, is below the acceptance criteria for perfluorooctanesulfonamide (fosa) (19%); however, it has been identified as a "difficult" analyte. The results of the associated samples are reported.
The WG1417013-2/-3 LCS/LCSD RPD, associated with L2040723-03, -04, and -07, is above the acceptance criteria for perfluorooctanesulfonamide (fosa) (147%).

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature: Elizabeth Porta

Title: Technical Director/Representative Date: 10/08/20

QC OUTLIER SUMMARY REPORT

Project Name: BARNSTABLE AIRPORT
Project Number: 20102

Lab Number: L2040723
Report Date: 10/08/20

Method	Client ID (Native ID)	Lab ID	Parameter	QC Type	Recovery/RPD (%)	QC Limits (%)	Associated Samples	Data Quality Assessment
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab								
LCMSMS-ID	Batch QC	WG1417013-2	Perfluorooctanesulfonamide (FOSA)	LCS	19	67-137	03-04,07	potential low bias
LCMSMS-ID	Batch QC	WG1417013-3	Perfluorooctanesulfonamide (FOSA)	LCSD	147	30	03-04,07	non-directional bias

ORGANICS

SEMIVOLATILES

Project Name: BARNSTABLE AIRPORT **Lab Number:** L2040723

Project Number: 20102 **Report Date:** 10/08/20

SAMPLE RESULTS

Lab ID: L2040723-03 RE
Client ID: A20 (0-1)
Sample Location: HYANNIS MA

Date Collected: 09/24/20 11:05
Date Received: 09/25/20
Field Prep: Not Specified

Sample Depth:
Matrix: Soil
Analytical Method: 134,LCMSMS-ID
Analytical Date: 10/02/20 21:06
Analyst: JW
Percent Solids: 98%

Extraction Method: ALPHA 23528
Extraction Date: 10/01/20 17:00

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						
Perfluorobutanoic Acid (PFBA)	ND		ng/g	2.00	0.045	1
Perfluoropentanoic Acid (PFPeA)	ND		ng/g	2.00	0.092	1
Perfluorobutanesulfonic Acid (PFBS)	ND		ng/g	2.00	0.078	1
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	ND		ng/g	2.00	0.129	1
Perfluorohexanoic Acid (PFHxA)	0.120	J	ng/g	2.00	0.105	1
Perfluoropentanesulfonic Acid (PFPeS)	ND		ng/g	2.00	0.166	1
Perfluoroheptanoic Acid (PFHpA)	ND		ng/g	2.00	0.090	1
Perfluorohexanesulfonic Acid (PFHxS)	ND		ng/g	2.00	0.121	1
Perfluorooctanoic Acid (PFOA)	0.196	J	ng/g	2.00	0.084	1
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND		ng/g	2.00	0.358	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		ng/g	2.00	0.272	1
Perfluorononanoic Acid (PFNA)	ND		ng/g	2.00	0.150	1
Perfluorooctanesulfonic Acid (PFOS)	ND		ng/g	2.00	0.259	1
Perfluorodecanoic Acid (PFDA)	ND		ng/g	2.00	0.134	1
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND		ng/g	2.00	0.572	1
Perfluorononanesulfonic Acid (PFNS)	ND		ng/g	2.00	0.596	1
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND		ng/g	20.0	0.402	1
Perfluoroundecanoic Acid (PFUnA)	ND		ng/g	2.00	0.093	1
Perfluorodecanesulfonic Acid (PFDS)	ND		ng/g	2.00	0.305	1
Perfluorooctanesulfonamide (FOSA)	ND		ng/g	20.0	0.196	1
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND		ng/g	20.0	0.168	1
Perfluorododecanoic Acid (PFDoA)	ND		ng/g	2.00	0.140	1
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/g	2.00	0.408	1
Perfluorotetradecanoic Acid (PFTA)	ND		ng/g	2.00	0.108	1

Project Name: BARNSTABLE AIRPORT **Lab Number:** L2040723

Project Number: 20102 **Report Date:** 10/08/20

SAMPLE RESULTS

Lab ID: L2040723-03 RE Date Collected: 09/24/20 11:05
Client ID: A20 (0-1) Date Received: 09/25/20
Sample Location: HYANNIS MA Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						

Surrogate (Extracted Internal Standard)	% Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	**24**	Q	60-153
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	**24**	Q	65-182
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	**36**	Q	70-151
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	**15**	Q	56-138
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	**25**	Q	61-147
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	**26**	Q	62-149
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	**38**	Q	63-166
Perfluoro[13C8]Octanoic Acid (M8PFOA)	**27**	Q	62-152
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	**20**	Q	32-182
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	**29**	Q	61-154
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	**38**	Q	65-151
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	**30**	Q	65-150
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	**21**	Q	25-186
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	**1**	Q	45-137
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	**30**	Q	64-158
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	2		1-125
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	**2**	Q	42-136
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	**28**	Q	56-148
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	**21**	Q	26-160

Project Name: BARNSTABLE AIRPORT
Lab Number: L2040723
Project Number: 20102
Report Date: 10/08/20

SAMPLE RESULTS

Lab ID: L2040723-04 RE
Client ID: A20 (2-4)
Sample Location: HYANNIS MA

Date Collected: 09/24/20 11:11
Date Received: 09/25/20
Field Prep: Not Specified

Sample Depth:
Matrix: Soil
Analytical Method: 134,LCMSMS-ID
Analytical Date: 10/02/20 21:23
Analyst: JW
Percent Solids: 97%

Extraction Method: ALPHA 23528
Extraction Date: 10/01/20 17:00

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						
Perfluorobutanoic Acid (PFBA)	ND		ng/g	2.00	0.045	1
Perfluoropentanoic Acid (PFPeA)	ND		ng/g	2.00	0.092	1
Perfluorobutanesulfonic Acid (PFBS)	ND		ng/g	2.00	0.078	1
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	ND		ng/g	2.00	0.129	1
Perfluorohexanoic Acid (PFHxA)	ND		ng/g	2.00	0.105	1
Perfluoropentanesulfonic Acid (PFPeS)	ND		ng/g	2.00	0.167	1
Perfluoroheptanoic Acid (PFHpA)	ND		ng/g	2.00	0.090	1
Perfluorohexanesulfonic Acid (PFHxS)	ND		ng/g	2.00	0.121	1
Perfluorooctanoic Acid (PFOA)	0.147	J	ng/g	2.00	0.084	1
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND		ng/g	2.00	0.359	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		ng/g	2.00	0.273	1
Perfluorononanoic Acid (PFNA)	ND		ng/g	2.00	0.150	1
Perfluorooctanesulfonic Acid (PFOS)	ND		ng/g	2.00	0.260	1
Perfluorodecanoic Acid (PFDA)	ND		ng/g	2.00	0.134	1
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND		ng/g	2.00	0.574	1
Perfluorononanesulfonic Acid (PFNS)	ND		ng/g	2.00	0.597	1
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND		ng/g	20.0	0.403	1
Perfluoroundecanoic Acid (PFUnA)	ND		ng/g	2.00	0.094	1
Perfluorodecanesulfonic Acid (PFDS)	ND		ng/g	2.00	0.306	1
Perfluorooctanesulfonamide (FOSA)	ND		ng/g	20.0	0.196	1
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND		ng/g	20.0	0.169	1
Perfluorododecanoic Acid (PFDoA)	ND		ng/g	2.00	0.140	1
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/g	2.00	0.409	1
Perfluorotetradecanoic Acid (PFTA)	ND		ng/g	2.00	0.108	1

Project Name: BARNSTABLE AIRPORT **Lab Number:** L2040723

Project Number: 20102 **Report Date:** 10/08/20

SAMPLE RESULTS

Lab ID: L2040723-04 RE Date Collected: 09/24/20 11:11
Client ID: A20 (2-4) Date Received: 09/25/20
Sample Location: HYANNIS MA Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor

Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab

Surrogate (Extracted Internal Standard)	% Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	**32**	Q	60-153
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	**31**	Q	65-182
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	**47**	Q	70-151
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	**24**	Q	56-138
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	**34**	Q	61-147
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	**36**	Q	62-149
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	**52**	Q	63-166
Perfluoro[13C8]Octanoic Acid (M8PFOA)	**37**	Q	62-152
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	**30**	Q	32-182
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	**38**	Q	61-154
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	**51**	Q	65-151
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	**39**	Q	65-150
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	25		25-186
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	**2**	Q	45-137
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	**41**	Q	64-158
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	10		1-125
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	**3**	Q	42-136
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	**36**	Q	56-148
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	29		26-160

Project Name: BARNSTABLE AIRPORT **Lab Number:** L2040723

Project Number: 20102 **Report Date:** 10/08/20

SAMPLE RESULTS

Lab ID: L2040723-05
Client ID: A21 (0-1)
Sample Location: HYANNIS MA

Date Collected: 09/24/20 11:20
Date Received: 09/25/20
Field Prep: Not Specified

Sample Depth:
Matrix: Soil
Analytical Method: 134,LCMSMS-ID
Analytical Date: 10/01/20 00:43
Analyst: JW
Percent Solids: 98%

Extraction Method: ALPHA 23528
Extraction Date: 09/30/20 09:20

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						
Perfluorobutanoic Acid (PFBA)	0.092	J	ng/g	0.997	0.023	1
Perfluoropentanoic Acid (PFPeA)	0.054	J	ng/g	0.997	0.046	1
Perfluorobutanesulfonic Acid (PFBS)	ND		ng/g	0.997	0.039	1
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	ND		ng/g	0.997	0.064	1
Perfluorohexanoic Acid (PFHxA)	0.058	J	ng/g	0.997	0.052	1
Perfluoropentanesulfonic Acid (PFPeS)	ND		ng/g	0.997	0.083	1
Perfluoroheptanoic Acid (PFHpA)	ND		ng/g	0.997	0.045	1
Perfluorohexanesulfonic Acid (PFHxS)	ND		ng/g	0.997	0.060	1
Perfluorooctanoic Acid (PFOA)	ND		ng/g	0.997	0.042	1
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND		ng/g	0.997	0.179	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		ng/g	0.997	0.136	1
Perfluorononanoic Acid (PFNA)	ND		ng/g	0.997	0.075	1
Perfluorooctanesulfonic Acid (PFOS)	0.276	J	ng/g	0.997	0.130	1
Perfluorodecanoic Acid (PFDA)	ND		ng/g	0.997	0.067	1
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND		ng/g	0.997	0.286	1
Perfluorononanesulfonic Acid (PFNS)	ND		ng/g	0.997	0.298	1
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND		ng/g	9.97	0.201	1
Perfluoroundecanoic Acid (PFUnA)	0.091	J	ng/g	0.997	0.047	1
Perfluorodecanesulfonic Acid (PFDS)	ND		ng/g	0.997	0.152	1
Perfluorooctanesulfonamide (FOSA)	ND		ng/g	9.97	0.098	1
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND		ng/g	9.97	0.084	1
Perfluorododecanoic Acid (PFDoA)	ND		ng/g	0.997	0.070	1
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/g	0.997	0.204	1
Perfluorotetradecanoic Acid (PFTA)	ND		ng/g	0.997	0.054	1

Project Name: BARNSTABLE AIRPORT **Lab Number:** L2040723

Project Number: 20102 **Report Date:** 10/08/20

SAMPLE RESULTS

Lab ID: L2040723-05 Date Collected: 09/24/20 11:20

Client ID: A21 (0-1) Date Received: 09/25/20

Sample Location: HYANNIS MA Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor

Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab

Surrogate (Extracted Internal Standard)	% Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	**38**	Q	60-153
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	**38**	Q	65-182
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	70		70-151
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	**42**	Q	56-138
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	**43**	Q	61-147
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	**45**	Q	62-149
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	78		63-166
Perfluoro[13C8]Octanoic Acid (M8PFOA)	**48**	Q	62-152
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	51		32-182
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	**55**	Q	61-154
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	71		65-151
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	**54**	Q	65-150
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	45		25-186
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	**6**	Q	45-137
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	**54**	Q	64-158
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	21		1-125
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	**9**	Q	42-136
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	**47**	Q	56-148
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	30		26-160

Project Name: BARNSTABLE AIRPORT **Lab Number:** L2040723

Project Number: 20102 **Report Date:** 10/08/20

SAMPLE RESULTS

Lab ID: L2040723-06
Client ID: A19 (0-1)
Sample Location: HYANNIS MA

Date Collected: 09/24/20 11:35
Date Received: 09/25/20
Field Prep: Not Specified

Sample Depth:
Matrix: Soil
Analytical Method: 134,LCMSMS-ID
Analytical Date: 10/01/20 00:59
Analyst: JW
Percent Solids: 97%

Extraction Method: ALPHA 23528
Extraction Date: 09/30/20 09:20

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						
Perfluorobutanoic Acid (PFBA)	0.128	J	ng/g	0.977	0.022	1
Perfluoropentanoic Acid (PFPeA)	0.099	J	ng/g	0.977	0.045	1
Perfluorobutanesulfonic Acid (PFBS)	ND		ng/g	0.977	0.038	1
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	ND		ng/g	0.977	0.063	1
Perfluorohexanoic Acid (PFHxA)	0.095	J	ng/g	0.977	0.051	1
Perfluoropentanesulfonic Acid (PFPeS)	ND		ng/g	0.977	0.082	1
Perfluoroheptanoic Acid (PFHpA)	0.101	J	ng/g	0.977	0.044	1
Perfluorohexanesulfonic Acid (PFHxS)	ND		ng/g	0.977	0.059	1
Perfluorooctanoic Acid (PFOA)	0.129	J	ng/g	0.977	0.041	1
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND		ng/g	0.977	0.175	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		ng/g	0.977	0.133	1
Perfluorononanoic Acid (PFNA)	0.246	J	ng/g	0.977	0.073	1
Perfluorooctanesulfonic Acid (PFOS)	0.611	JF	ng/g	0.977	0.127	1
Perfluorodecanoic Acid (PFDA)	ND		ng/g	0.977	0.066	1
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND		ng/g	0.977	0.280	1
Perfluorononanesulfonic Acid (PFNS)	ND		ng/g	0.977	0.292	1
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND		ng/g	9.77	0.197	1
Perfluoroundecanoic Acid (PFUnA)	ND		ng/g	0.977	0.046	1
Perfluorodecanesulfonic Acid (PFDS)	ND		ng/g	0.977	0.150	1
Perfluorooctanesulfonamide (FOSA)	ND		ng/g	9.77	0.096	1
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND		ng/g	9.77	0.083	1
Perfluorododecanoic Acid (PFDoA)	ND		ng/g	0.977	0.068	1
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/g	0.977	0.200	1
Perfluorotetradecanoic Acid (PFTA)	ND		ng/g	0.977	0.053	1

Project Name: BARNSTABLE AIRPORT **Lab Number:** L2040723

Project Number: 20102 **Report Date:** 10/08/20

SAMPLE RESULTS

Lab ID: L2040723-06 Date Collected: 09/24/20 11:35

Client ID: A19 (0-1) Date Received: 09/25/20

Sample Location: HYANNIS MA Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor

Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab

Surrogate (Extracted Internal Standard)	% Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	**50**	Q	60-153
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	**50**	Q	65-182
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	77		70-151
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	**31**	Q	56-138
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	**56**	Q	61-147
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	**58**	Q	62-149
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	84		63-166
Perfluoro[13C8]Octanoic Acid (M8PFOA)	**60**	Q	62-152
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	36		32-182
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	64		61-154
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	78		65-151
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	**62**	Q	65-150
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	39		25-186
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	**1**	Q	45-137
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	**59**	Q	64-158
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	8		1-125
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	**1**	Q	42-136
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	**50**	Q	56-148
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	**25**	Q	26-160

Project Name: BARNSTABLE AIRPORT **Lab Number:** L2040723

Project Number: 20102 **Report Date:** 10/08/20

SAMPLE RESULTS

Lab ID: L2040723-07 RE
Client ID: AS5 (2-4)
Sample Location: HYANNIS MA

Date Collected: 09/24/20 11:50
Date Received: 09/25/20
Field Prep: Not Specified

Sample Depth:
Matrix: Soil
Analytical Method: 134,LCMSMS-ID
Analytical Date: 10/02/20 21:39
Analyst: JW
Percent Solids: 97%

Extraction Method: ALPHA 23528
Extraction Date: 10/01/20 17:00

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						
Perfluorobutanoic Acid (PFBA)	0.066	J	ng/g	1.98	0.045	1
Perfluoropentanoic Acid (PFPeA)	0.153	J	ng/g	1.98	0.091	1
Perfluorobutanesulfonic Acid (PFBS)	ND		ng/g	1.98	0.077	1
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	ND		ng/g	1.98	0.128	1
Perfluorohexanoic Acid (PFHxA)	0.166	J	ng/g	1.98	0.104	1
Perfluoropentanesulfonic Acid (PFPeS)	ND		ng/g	1.98	0.165	1
Perfluoroheptanoic Acid (PFHpA)	ND		ng/g	1.98	0.089	1
Perfluorohexanesulfonic Acid (PFHxS)	ND		ng/g	1.98	0.120	1
Perfluorooctanoic Acid (PFOA)	0.228	J	ng/g	1.98	0.083	1
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND		ng/g	1.98	0.355	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		ng/g	1.98	0.270	1
Perfluorononanoic Acid (PFNA)	ND		ng/g	1.98	0.148	1
Perfluorooctanesulfonic Acid (PFOS)	ND		ng/g	1.98	0.257	1
Perfluorodecanoic Acid (PFDA)	ND		ng/g	1.98	0.133	1
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND		ng/g	1.98	0.568	1
Perfluorononanesulfonic Acid (PFNS)	ND		ng/g	1.98	0.592	1
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND		ng/g	19.8	0.399	1
Perfluoroundecanoic Acid (PFUnA)	ND		ng/g	1.98	0.093	1
Perfluorodecanesulfonic Acid (PFDS)	ND		ng/g	1.98	0.303	1
Perfluorooctanesulfonamide (FOSA)	ND		ng/g	19.8	0.194	1
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND		ng/g	19.8	0.167	1
Perfluorododecanoic Acid (PFDoA)	ND		ng/g	1.98	0.138	1
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/g	1.98	0.405	1
Perfluorotetradecanoic Acid (PFTA)	ND		ng/g	1.98	0.107	1

Project Name: BARNSTABLE AIRPORT **Lab Number:** L2040723

Project Number: 20102 **Report Date:** 10/08/20

SAMPLE RESULTS

Lab ID: L2040723-07 RE Date Collected: 09/24/20 11:50
Client ID: AS5 (2-4) Date Received: 09/25/20
Sample Location: HYANNIS MA Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						

Surrogate (Extracted Internal Standard)	% Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	**53**	Q	60-153
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	**52**	Q	65-182
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	72		70-151
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	**40**	Q	56-138
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	**57**	Q	61-147
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	**60**	Q	62-149
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	80		63-166
Perfluoro[13C8]Octanoic Acid (M8PFOA)	**61**	Q	62-152
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	44		32-182
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	64		61-154
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	78		65-151
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	**63**	Q	65-150
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	48		25-186
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	**3**	Q	45-137
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	65		64-158
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	2		1-125
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	**3**	Q	42-136
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	59		56-148
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	47		26-160

Project Name: BARNSTABLE AIRPORT **Lab Number:** L2040723

Project Number: 20102 **Report Date:** 10/08/20

Method Blank Analysis
Batch Quality Control

Analytical Method: 134,LCMSMS-ID
Analytical Date: 09/30/20 19:11
Analyst: JW

Extraction Method: ALPHA 23528
Extraction Date: 09/30/20 09:20

Parameter	Result	Qualifier	Units	RL	MDL
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab for sample(s): 05-06 Batch: WG1416277-1					
Perfluorobutanoic Acid (PFBA)	ND		ng/g	1.00	0.023
Perfluoropentanoic Acid (PFPeA)	ND		ng/g	1.00	0.046
Perfluorobutanesulfonic Acid (PFBS)	ND		ng/g	1.00	0.039
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	ND		ng/g	1.00	0.065
Perfluorohexanoic Acid (PFHxA)	ND		ng/g	1.00	0.053
Perfluoropentanesulfonic Acid (PFPeS)	ND		ng/g	1.00	0.084
Perfluoroheptanoic Acid (PFHpA)	ND		ng/g	1.00	0.045
Perfluorohexanesulfonic Acid (PFHxS)	ND		ng/g	1.00	0.061
Perfluorooctanoic Acid (PFOA)	ND		ng/g	1.00	0.042
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND		ng/g	1.00	0.180
Perfluoroheptanesulfonic Acid (PFHpS)	ND		ng/g	1.00	0.136
Perfluorononanoic Acid (PFNA)	ND		ng/g	1.00	0.075
Perfluorooctanesulfonic Acid (PFOS)	ND		ng/g	1.00	0.130
Perfluorodecanoic Acid (PFDA)	ND		ng/g	1.00	0.067
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND		ng/g	1.00	0.287
Perfluorononanesulfonic Acid (PFNS)	ND		ng/g	1.00	0.299
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND		ng/g	1.00	0.202
Perfluoroundecanoic Acid (PFUnA)	ND		ng/g	1.00	0.047
Perfluorodecanesulfonic Acid (PFDS)	ND		ng/g	1.00	0.153
Perfluorooctanesulfonamide (FOSA)	ND		ng/g	10.0	0.098
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND		ng/g	1.00	0.085
Perfluorododecanoic Acid (PFDoA)	ND		ng/g	1.00	0.070
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/g	1.00	0.204
Perfluorotetradecanoic Acid (PFTA)	ND		ng/g	1.00	0.054
PFOA/PFOS, Total	ND		ng/g	1.00	0.042
PFAS, Total (5)	ND		ng/g	1.00	0.042

Project Name: BARNSTABLE AIRPORT **Lab Number:** L2040723

Project Number: 20102 **Report Date:** 10/08/20

Method Blank Analysis
Batch Quality Control

Analytical Method: 134,LCMSMS-ID
Analytical Date: 09/30/20 19:11
Analyst: JW

Extraction Method: ALPHA 23528
Extraction Date: 09/30/20 09:20

Parameter	Result	Qualifier	Units	RL	MDL
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab for sample(s): 05-06 Batch: WG1416277-1					

Surrogate (Extracted Internal Standard)	%Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	77		60-153
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	78		65-182
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	90		70-151
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	**50**	Q	56-138
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	80		61-147
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	82		62-149
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	97		63-166
Perfluoro[13C8]Octanoic Acid (M8PFOA)	85		62-152
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	62		32-182
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	95		61-154
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	95		65-151
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	88		65-150
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	64		25-186
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	53		45-137
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	87		64-158
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	**0**	Q	1-125
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	66		42-136
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	77		56-148
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	57		26-160

Project Name: BARNSTABLE AIRPORT **Lab Number:** L2040723

Project Number: 20102 **Report Date:** 10/08/20

Method Blank Analysis
Batch Quality Control

Analytical Method: 134,LCMSMS-ID
Analytical Date: 10/02/20 19:44
Analyst: JW

Extraction Method: ALPHA 23528
Extraction Date: 10/01/20 17:00

Parameter	Result	Qualifier	Units	RL	MDL
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab for sample(s): 03-04,07 Batch: WG1417013-1					
Perfluorobutanoic Acid (PFBA)	ND		ng/g	1.00	0.023
Perfluoropentanoic Acid (PFPeA)	ND		ng/g	1.00	0.046
Perfluorobutanesulfonic Acid (PFBS)	ND		ng/g	1.00	0.039
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	ND		ng/g	1.00	0.065
Perfluorohexanoic Acid (PFHxA)	ND		ng/g	1.00	0.053
Perfluoropentanesulfonic Acid (PFPeS)	ND		ng/g	1.00	0.084
Perfluoroheptanoic Acid (PFHpA)	ND		ng/g	1.00	0.045
Perfluorohexanesulfonic Acid (PFHxS)	ND		ng/g	1.00	0.061
Perfluorooctanoic Acid (PFOA)	ND		ng/g	1.00	0.042
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND		ng/g	1.00	0.180
Perfluoroheptanesulfonic Acid (PFHpS)	ND		ng/g	1.00	0.136
Perfluorononanoic Acid (PFNA)	ND		ng/g	1.00	0.075
Perfluorooctanesulfonic Acid (PFOS)	ND		ng/g	1.00	0.130
Perfluorodecanoic Acid (PFDA)	ND		ng/g	1.00	0.067
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND		ng/g	1.00	0.287
Perfluorononanesulfonic Acid (PFNS)	ND		ng/g	1.00	0.299
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND		ng/g	1.00	0.202
Perfluoroundecanoic Acid (PFUnA)	ND		ng/g	1.00	0.047
Perfluorodecanesulfonic Acid (PFDS)	ND		ng/g	1.00	0.153
Perfluorooctanesulfonamide (FOSA)	ND		ng/g	10.0	0.098
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND		ng/g	1.00	0.085
Perfluorododecanoic Acid (PFDoA)	ND		ng/g	1.00	0.070
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/g	1.00	0.204
Perfluorotetradecanoic Acid (PFTA)	ND		ng/g	1.00	0.054

Project Name: BARNSTABLE AIRPORT **Lab Number:** L2040723

Project Number: 20102 **Report Date:** 10/08/20

Method Blank Analysis
Batch Quality Control

Analytical Method: 134,LCMSMS-ID
Analytical Date: 10/02/20 19:44
Analyst: JW

Extraction Method: ALPHA 23528
Extraction Date: 10/01/20 17:00

Parameter	Result	Qualifier	Units	RL	MDL
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab for sample(s): 03-04,07 Batch: WG1417013-1					

Surrogate (Extracted Internal Standard)	%Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	**49**	Q	60-153
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	**53**	Q	65-182
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	97		70-151
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	60		56-138
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	65		61-147
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	76		62-149
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	103		63-166
Perfluoro[13C8]Octanoic Acid (M8PFOA)	84		62-152
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	71		32-182
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	88		61-154
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	99		65-151
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	94		65-150
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	66		25-186
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	69		45-137
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	96		64-158
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	**0**	Q	1-125
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	74		42-136
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	84		56-148
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	65		26-160

Lab Control Sample Analysis
Batch Quality Control

Project Name: BARNSTABLE AIRPORT
Project Number: 20102

Lab Number: L2040723
Report Date: 10/08/20

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 05-06 Batch: WG1416277-2 WG1416277-3								
Perfluorobutanoic Acid (PFBA)	104		104		71-135	0		30
Perfluoropentanoic Acid (PFPeA)	102		102		69-132	0		30
Perfluorobutanesulfonic Acid (PFBS)	102		103		72-128	1		30
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	104		112		62-145	7		30
Perfluorohexanoic Acid (PFHxA)	105		106		70-132	1		30
Perfluoropentanesulfonic Acid (PFPeS)	92		91		73-123	1		30
Perfluoroheptanoic Acid (PFHpA)	106		103		71-131	3		30
Perfluorohexanesulfonic Acid (PFHxS)	101		100		67-130	1		30
Perfluorooctanoic Acid (PFOA)	103		104		69-133	1		30
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	116		114		64-140	2		30
Perfluoroheptanesulfonic Acid (PFHpS)	109		105		70-132	4		30
Perfluorononanoic Acid (PFNA)	100		99		72-129	1		30
Perfluorooctanesulfonic Acid (PFOS)	111		112		68-136	1		30
Perfluorodecanoic Acid (PFDA)	102		103		69-133	1		30
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	123		113		65-137	8		30
Perfluorononanesulfonic Acid (PFNS)	115		118		69-125	3		30
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	120		115		63-144	4		30
Perfluoroundecanoic Acid (PFUnA)	110		107		64-136	3		30
Perfluorodecanesulfonic Acid (PFDS)	126		119		59-134	6		30
Perfluorooctanesulfonamide (FOSA)	88		84		67-137	5		30
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	116		114		61-139	2		30
Perfluorododecanoic Acid (PFDoA)	110		111		69-135	1		30

Lab Control Sample Analysis

Batch Quality Control

Project Name: BARNSTABLE AIRPORT

Project Number: 20102

Lab Number: L2040723

Report Date: 10/08/20

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 05-06 Batch: WG1416277-2 WG1416277-3								
Perfluorotridecanoic Acid (PFTrDA)	106		106		66-139	0		30
Perfluorotetradecanoic Acid (PFTA)	110		108		69-133	2		30

Surrogate (Extracted Internal Standard)	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	81		80		60-153
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	80		81		65-182
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	87		94		70-151
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	**53**	Q	**55**	Q	56-138
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	83		85		61-147
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	83		88		62-149
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	93		101		63-166
Perfluoro[13C8]Octanoic Acid (M8PFOA)	88		91		62-152
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	63		68		32-182
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	93		99		61-154
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	88		98		65-151
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	89		95		65-150
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	65		71		25-186
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	55		64		45-137
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	90		94		64-158
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	1		2		1-125
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	68		69		42-136
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	80		82		56-148
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	57		61		26-160

Lab Control Sample Analysis

Batch Quality Control

Project Name: BARNSTABLE AIRPORT

Project Number: 20102

Lab Number: L2040723

Report Date: 10/08/20

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 03-04,07 Batch: WG1417013-2 WG1417013-3								
Perfluorobutanoic Acid (PFBA)	105		104		71-135	1		30
Perfluoropentanoic Acid (PFPeA)	106		104		69-132	2		30
Perfluorobutanesulfonic Acid (PFBS)	99		98		72-128	1		30
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	114		112		62-145	2		30
Perfluorohexanoic Acid (PFHxA)	106		105		70-132	1		30
Perfluoropentanesulfonic Acid (PFPeS)	91		92		73-123	1		30
Perfluoroheptanoic Acid (PFHpA)	102		103		71-131	1		30
Perfluorohexanesulfonic Acid (PFHxS)	102		101		67-130	1		30
Perfluorooctanoic Acid (PFOA)	104		105		69-133	1		30
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	117		110		64-140	6		30
Perfluoroheptanesulfonic Acid (PFHpS)	103		108		70-132	5		30
Perfluorononanoic Acid (PFNA)	104		103		72-129	1		30
Perfluorooctanesulfonic Acid (PFOS)	111		106		68-136	5		30
Perfluorodecanoic Acid (PFDA)	100		102		69-133	2		30
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	106		116		65-137	9		30
Perfluorononanesulfonic Acid (PFNS)	119		121		69-125	2		30
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	118		98		63-144	19		30
Perfluoroundecanoic Acid (PFUnA)	108		104		64-136	4		30
Perfluorodecanesulfonic Acid (PFDS)	125		121		59-134	3		30
Perfluorooctanesulfonamide (FOSA)	**19**	Q	124		67-137	**147**	Q	30
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	106		115		61-139	8		30
Perfluorododecanoic Acid (PFDoA)	110		108		69-135	2		30

Lab Control Sample Analysis

Batch Quality Control

Project Name: BARNSTABLE AIRPORT

Project Number: 20102

Lab Number: L2040723

Report Date: 10/08/20

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 03-04,07 Batch: WG1417013-2 WG1417013-3								
Perfluorotridecanoic Acid (PFTrDA)	108		102		66-139	6		30
Perfluorotetradecanoic Acid (PFTA)	102		102		69-133	0		30

Surrogate (Extracted Internal Standard)	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	73		79		60-153
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	72		78		65-182
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	101		102		70-151
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	68		69		56-138
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	82		87		61-147
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	89		91		62-149
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	108		108		63-166
Perfluoro[13C8]Octanoic Acid (M8PFOA)	92		94		62-152
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	80		79		32-182
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	94		97		61-154
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	102		103		65-151
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	97		96		65-150
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	78		81		25-186
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	68		79		45-137
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	96		96		64-158
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	**0**	Q	**0**	Q	1-125
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	83		78		42-136
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	88		87		56-148
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	68		66		26-160

INORGANICS
&
MISCELLANEOUS

Project Name: BARNSTABLE AIRPORT
Project Number: 20102
Lab Number: L2040723
Report Date: 10/08/20

SAMPLE RESULTS

Lab ID: L2040723-01
Client ID: A5 (12-14)
Sample Location: HYANNIS MA
Sample Depth:
Matrix: Soil

Date Collected: 09/24/20 09:46
Date Received: 09/25/20
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Mansfield Lab										
Solids, Total	79.8		%	0.100	0.100	1	-	09/27/20 11:46	121,2540G	JW

Project Name: BARNSTABLE AIRPORT
Project Number: 20102
Lab Number: L2040723
Report Date: 10/08/20

SAMPLE RESULTS

Lab ID: L2040723-02
Client ID: A5 (18-20)
Sample Location: HYANNIS MA
Sample Depth:
Matrix: Soil

Date Collected: 09/24/20 09:57
Date Received: 09/25/20
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Mansfield Lab										
Solids, Total	97.8		%	0.100	0.100	1	-	09/27/20 11:46	121,2540G	JW

Project Name: BARNSTABLE AIRPORT
Project Number: 20102
Lab Number: L2040723
Report Date: 10/08/20

SAMPLE RESULTS

Lab ID: L2040723-03
Client ID: A20 (0-1)
Sample Location: HYANNIS MA
Sample Depth:
Matrix: Soil

Date Collected: 09/24/20 11:05
Date Received: 09/25/20
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Mansfield Lab										
Solids, Total	97.8		%	0.100	0.100	1	-	09/27/20 11:46	121,2540G	JW

Project Name: BARNSTABLE AIRPORT
Project Number: 20102
Lab Number: L2040723
Report Date: 10/08/20

SAMPLE RESULTS

Lab ID: L2040723-04
Client ID: A20 (2-4)
Sample Location: HYANNIS MA
Sample Depth:
Matrix: Soil

Date Collected: 09/24/20 11:11
Date Received: 09/25/20
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Mansfield Lab										
Solids, Total	96.7		%	0.100	0.100	1	-	09/27/20 11:46	121,2540G	JW

Project Name: BARNSTABLE AIRPORT
Project Number: 20102
Lab Number: L2040723
Report Date: 10/08/20

SAMPLE RESULTS

Lab ID: L2040723-05
Client ID: A21 (0-1)
Sample Location: HYANNIS MA
Sample Depth:
Matrix: Soil

Date Collected: 09/24/20 11:20
Date Received: 09/25/20
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Mansfield Lab										
Solids, Total	98.1		%	0.100	0.100	1	-	09/27/20 11:46	121,2540G	JW

Project Name: BARNSTABLE AIRPORT
Project Number: 20102

Lab Number: L2040723
Report Date: 10/08/20

SAMPLE RESULTS

Lab ID: L2040723-06
Client ID: A19 (0-1)
Sample Location: HYANNIS MA

Date Collected: 09/24/20 11:35
Date Received: 09/25/20
Field Prep: Not Specified

Sample Depth:
Matrix: Soil

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Mansfield Lab										
Solids, Total	97.0		%	0.100	0.100	1	-	09/27/20 11:46	121,2540G	JW

Project Name: BARNSTABLE AIRPORT
Project Number: 20102
Lab Number: L2040723
Report Date: 10/08/20

SAMPLE RESULTS

Lab ID: L2040723-07
Client ID: AS5 (2-4)
Sample Location: HYANNIS MA
Sample Depth:
Matrix: Soil

Date Collected: 09/24/20 11:50
Date Received: 09/25/20
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Mansfield Lab										
Solids, Total	96.7		%	0.100	0.100	1	-	09/27/20 11:46	121,2540G	JW

Project Name: BARNSTABLE AIRPORT
Project Number: 20102

Lab Number: L2040723
Report Date: 10/08/20

Sample Receipt and Container Information

Were project specific reporting limits specified? YES

Cooler Information

Cooler	Custody Seal
A	Absent

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L2040723-01A	Plastic 8oz unpreserved	A	NA		4.9	Y	Absent		A2-S-EXT-537(28)
L2040723-01B	Plastic 2oz unpreserved for TS	A	NA		4.9	Y	Absent		A2-TS(7)
L2040723-02A	Plastic 8oz unpreserved	A	NA		4.9	Y	Absent		A2-S-EXT-537(28)
L2040723-02B	Plastic 2oz unpreserved for TS	A	NA		4.9	Y	Absent		A2-TS(7)
L2040723-03A	Plastic 8oz unpreserved	A	NA		4.9	Y	Absent		A2-537-ISOTOPE(14)
L2040723-03B	Plastic 2oz unpreserved for TS	A	NA		4.9	Y	Absent		A2-TS(7)
L2040723-04A	Plastic 8oz unpreserved	A	NA		4.9	Y	Absent		A2-537-ISOTOPE(14)
L2040723-04B	Plastic 2oz unpreserved for TS	A	NA		4.9	Y	Absent		A2-TS(7)
L2040723-05A	Plastic 8oz unpreserved	A	NA		4.9	Y	Absent		A2-537-ISOTOPE(14)
L2040723-05B	Plastic 2oz unpreserved for TS	A	NA		4.9	Y	Absent		A2-TS(7)
L2040723-06A	Plastic 8oz unpreserved	A	NA		4.9	Y	Absent		A2-537-ISOTOPE(14)
L2040723-06B	Plastic 2oz unpreserved for TS	A	NA		4.9	Y	Absent		A2-TS(7)
L2040723-07A	Plastic 8oz unpreserved	A	NA		4.9	Y	Absent		A2-537-ISOTOPE(14)
L2040723-07B	Plastic 2oz unpreserved for TS	A	NA		4.9	Y	Absent		A2-TS(7)

*Values in parentheses indicate holding time in days

Project Name: BARNSTABLE AIRPORT
Project Number: 20102
Lab Number: L2040723
Report Date: 10/08/20

PFAS PARAMETER SUMMARY

Parameter	Acronym	CAS Number
PERFLUOROALKYL CARBOXYLIC ACIDS (PFCAs)		
Perfluorooctadecanoic Acid	PFODA	16517-11-6
Perfluorohexadecanoic Acid	PFHxDA	67905-19-5
Perfluorotetradecanoic Acid	PFTA	376-06-7
Perfluorotridecanoic Acid	PFTrDA	72629-94-8
Perfluorododecanoic Acid	PFDoA	307-55-1
Perfluoroundecanoic Acid	PFUnA	2058-94-8
Perfluorodecanoic Acid	PFDA	335-76-2
Perfluorononanoic Acid	PFNA	375-95-1
Perfluorooctanoic Acid	PFOA	335-67-1
Perfluoroheptanoic Acid	PFHpA	375-85-9
Perfluorohexanoic Acid	PFHxA	307-24-4
Perfluoropentanoic Acid	PFPeA	2706-90-3
Perfluorobutanoic Acid	PFBA	375-22-4
PERFLUOROALKYL SULFONIC ACIDS (PFSAs)		
Perfluorododecanesulfonic Acid	PFDoDS	79780-39-5
Perfluorodecanesulfonic Acid	PFDS	335-77-3
Perfluorononanesulfonic Acid	PFNS	68259-12-1
Perfluorooctanesulfonic Acid	PFOS	1763-23-1
Perfluoroheptanesulfonic Acid	PFHpS	375-92-8
Perfluorohexanesulfonic Acid	PFHxS	355-46-4
Perfluoropentanesulfonic Acid	PFPeS	2706-91-4
Perfluorobutanesulfonic Acid	PFBS	375-73-5
FLUOROTELOMERS		
1H,1H,2H,2H-Perfluorododecanesulfonic Acid	10:2FTS	120226-60-0
1H,1H,2H,2H-Perfluorodecanesulfonic Acid	8:2FTS	39108-34-4
1H,1H,2H,2H-Perfluorooctanesulfonic Acid	6:2FTS	27619-97-2
1H,1H,2H,2H-Perfluorohexanesulfonic Acid	4:2FTS	757124-72-4
PERFLUOROALKANE SULFONAMIDES (FASAs)		
Perfluorooctanesulfonamide	FOSA	754-91-6
N-Ethyl Perfluorooctane Sulfonamide	NEtFOSA	4151-50-2
N-Methyl Perfluorooctane Sulfonamide	NMeFOSA	31506-32-8
PERFLUOROALKANE SULFONYL SUBSTANCES		
N-Ethyl Perfluorooctanesulfonamido Ethanol	NEtFOSE	1691-99-2
N-Methyl Perfluorooctanesulfonamido Ethanol	NMeFOSE	24448-09-7
N-Ethyl Perfluorooctanesulfonamidoacetic Acid	NEtFOSAA	2991-50-6
N-Methyl Perfluorooctanesulfonamidoacetic Acid	NMeFOSAA	2355-31-9
PER- and POLYFLUOROALKYL ETHER CARBOXYLIC ACIDS		
2,3,3,3-Tetrafluoro-2-[1,1,2,2,3,3,3-Heptafluoropropoxy]-Propanoic Acid	HFPO-DA	13252-13-6
4,8-Dioxa-3h-Perfluorononanoic Acid	ADONA	919005-14-4
CHLORO-PERFLUOROALKYL SULFONIC ACIDS		
11-Chloroeicosafluoro-3-Oxaundecane-1-Sulfonic Acid	11Cl-PF3OUdS	763051-92-9
9-Chlorohexadecafluoro-3-Oxanone-1-Sulfonic Acid	9Cl-PF3ONS	756426-58-1
PERFLUOROETHER SULFONIC ACIDS (PFESAs)		
Perfluoro(2-Ethoxyethane)Sulfonic Acid	PFEESA	113507-82-7
PERFLUOROETHER/POLYETHER CARBOXYLIC ACIDS (PFPCAs)		
Perfluoro-3-Methoxypropanoic Acid	PFMPA	377-73-1
Perfluoro-4-Methoxybutanoic Acid	PFMBA	863090-89-5
Nonafluoro-3,6-Dioxaheptanoic Acid	NFDHA	151772-58-6

Project Name:	BARNSTABLE AIRPORT	**Lab Number:**	L2040723
Project Number:	20102	**Report Date:**	10/08/20

GLOSSARY

Acronyms

DL - Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the limit of quantitation (LOQ). The DL includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

EDL - Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).

EMPC - Estimated Maximum Possible Concentration: The concentration that results from the signal present at the retention time of an analyte when the ions meet all of the identification criteria except the ion abundance ratio criteria. An EMPC is a worst-case estimate of the concentration.

EPA - Environmental Protection Agency.

LCS - Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

LCSD - Laboratory Control Sample Duplicate: Refer to LCS.

LFB - Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

LOD - Limit of Detection: This value represents the level to which a target analyte can reliably be detected for a specific analyte in a specific matrix by a specific method. The LOD includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

LOQ - Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

MDL - Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

MS - Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available. For Method 332.0, the spike recovery is calculated using the native concentration, including estimated values.

MSD - Matrix Spike Sample Duplicate: Refer to MS.

NA - Not Applicable.

NC - Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.

NDPA/DPA - N-Nitrosodiphenylamine/Diphenylamine.

NI - Not Ignitable.

NP - Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.

NR - No Results: Term is utilized when 'No Target Compounds Requested' is reported for the analysis of Volatile or Semivolatile Organic TIC only requests.

RL - Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

RPD - Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.

SRM - Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.

STLP - Semi-dynamic Tank Leaching Procedure per EPA Method 1315.

TEF - Toxic Equivalency Factors: The values assigned to each dioxin and furan to evaluate their toxicity relative to 2,3,7,8-TCDD.

TEQ - Toxic Equivalent: The measure of a sample's toxicity derived by multiplying each dioxin and furan by its corresponding TEF and then summing the resulting values.

TIC - Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

Report Format: DU Report with 'J' Qualifiers

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Footnotes

1 - The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

Terms

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

Difference: With respect to Total Oxidizable Precursor (TOP) Assay analysis, the difference is defined as the Post-Treatment value minus the Pre-Treatment value.

Final pH: As it pertains to Sample Receipt & Container Information section of the report, Final pH reflects pH of container determined after adjustment at the laboratory, if applicable. If no adjustment required, value reflects Initial pH.

Frozen Date/Time: With respect to Volatile Organics in soil, Frozen Date/Time reflects the date/time at which associated Reagent Water-preserved vials were initially frozen. Note: If frozen date/time is beyond 48 hours from sample collection, value will be reflected in 'bold'.

Initial pH: As it pertains to Sample Receipt & Container Information section of the report, Initial pH reflects pH of container determined upon receipt, if applicable.

PAH Total: With respect to Alkylated PAH analyses, the 'PAHs, Total' result is defined as the summation of results for all or a subset of the following compounds: Naphthalene, C1-C4 Naphthalenes, 2-Methylnaphthalene, 1-Methylnaphthalene, Biphenyl, Acenaphthylene, Acenaphthene, Fluorene, C1-C3 Fluorenes, Phenanthrene, C1-C4 Phenanthrenes/Anthracenes, Anthracene, Fluoranthene, Pyrene, C1-C4 Fluoranthenes/Pyrenes, Benz(a)anthracene, Chrysene, C1-C4 Chrysenes, Benzo(b)fluoranthene, Benzo(j)+(k)fluoranthene, Benzo(e)pyrene, Benzo(a)pyrene, Perylene, Indeno(1,2,3-cd)pyrene, Dibenz(ah)+(ac)anthracene, Benzo(g,h,i)perylene. If a 'Total' result is requested, the results of its individual components will also be reported.

PFAS Total: With respect to PFAS analyses, the 'PFAS, Total (5)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA and PFOS. If a 'Total' result is requested, the results of its individual components will also be reported.

The target compound Chlordane (CAS No. 57-74-9) is reported for GC ECD analyses. Per EPA,this compound "refers to a mixture of chlordane isomers, other chlorinated hydrocarbons and numerous other components." (Reference: USEPA Toxicological Review of Chlordane, In Support of Summary Information on the Integrated Risk Information System (IRIS), December 1997.)

Total: With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

Data Qualifiers

A - Spectra identified as "Aldol Condensates" are byproducts of the extraction/concentration procedures when acetone is introduced in the process.

B - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).

C - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.

D - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.

E - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

F - The ratio of quantifier ion response to qualifier ion response falls outside of the laboratory criteria. Results are considered to be an estimated maximum concentration.

G - The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.

H - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.

I - The lower value for the two columns has been reported due to obvious interference.

J - Estimated value. The Target analyte concentration is below the quantitation limit (RL), but above the Method Detection Limit (MDL) or Estimated Detection Limit (EDL) for SPME-related analyses. This represents an estimated concentration for Tentatively Identified Compounds (TICs).

M - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.

ND - Not detected at the method detection limit (MDL) for the sample, or estimated detection limit (EDL) for SPME-related analyses.

NJ - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where

Report Format: DU Report with 'J' Qualifiers

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Data Qualifiers

the identification is based on a mass spectral library search.

P - The RPD between the results for the two columns exceeds the method-specified criteria.

Q - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)

R - Analytical results are from sample re-analysis.

RE - Analytical results are from sample re-extraction.

S - Analytical results are from modified screening analysis.

Project Name: BARNSTABLE AIRPORT **Lab Number:** L2040723

Project Number: 20102 **Report Date:** 10/08/20

REFERENCES

121 Standard Methods for the Examination of Water and Wastewater. APHA-AWWA-WEF. Standard Methods Online.

134 Determination of Selected Perfluorinated Alkyl Acids in Drinking Water by Solid Phase Extraction and Liquid Chromatography/Tandem Mass Spectrometry (LC/MS/MS) using Isotope Dilution. Alpha SOP 23528.

LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.

Certification Information

The following analytes are not included in our Primary NELAP Scope of Accreditation:

Westborough Facility
EPA 624/624.1: m/p-xylene, o-xylene, Naphthalene
EPA 8260C: NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene; SCM: Iodomethane (methyl iodide), 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.
EPA 8270D: NPW: Dimethylnaphthalene,1,4-Diphenylhydrazine; SCM: Dimethylnaphthalene,1,4-Diphenylhydrazine.
SM4500: NPW: Amenable Cyanide; SCM: Total Phosphorus, TKN, NO2, NO3.

Mansfield Facility
SM 2540D: TSS
EPA 8082A: NPW: PCB: 1, 5, 31, 87,101, 110, 141, 151, 153, 180, 183, 187.
EPA TO-15: Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.
EPA TO-12 Non-methane organics
EPA 3C Fixed gases
Biological Tissue Matrix: EPA 3050B

The following analytes are included in our Massachusetts DEP Scope of Accreditation

Westborough Facility:

Drinking Water
EPA 300.0: Chloride, Nitrate-N, Fluoride, Sulfate; **EPA 353.2**: Nitrate-N, Nitrite-N; **SM4500NO3-F**: Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500Cl-D, SM2320B, SM2540C, SM4500H-B, SM4500NO2-B**
EPA 332: Perchlorate; **EPA 524.2:** THMs and VOCs; **EPA 504.1:** EDB, DBCP.
Microbiology: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT,SM9222D**.

Non-Potable Water
SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2320B, SM4500CL-E, SM4500F-BC, SM4500NH3-BH: Ammonia-N and Kjeldahl-N, **EPA 350.1**: Ammonia-N, **LACHAT 10-107-06-1-B**: Ammonia-N, **EPA 351.1, SM4500NO3-F, EPA 353.2**: Nitrate-N**, SM4500P-E, SM4500P-B, E, SM4500SO4-E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, EPA 420.1, SM4500-CN-CE, SM2540D, EPA 300: Chloride, Sulfate, Nitrate.**
EPA 624.1: Volatile Halocarbons & Aromatics,
EPA 608.3: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs
EPA 625.1: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045**: PCB-Oil.
Microbiology: **SM9223B-Colilert-QT; Enterolert-QT, SM9221E, EPA 1600, EPA 1603.**

Mansfield Facility:

Drinking Water
EPA 200.7: Al, Ba, Cd, Cr, Cu, Fe, Mn, Ni, Na, Ag, Ca, Zn. **EPA 200.8:** Al, Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Mn, Ni, Se, Ag, TL, Zn. **EPA 245.1** Hg.
EPA 522.

Non-Potable Water
EPA 200.7: Al, Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Sr, TL, Ti, V, Zn.
EPA 200.8: Al, Sb**,** As, Be, Cd, Cr, Cu, Fe, Pb, Mn, Ni, K, Se, Ag, Na, TL, Zn.
EPA 245.1 Hg.
SM2340B

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

CHAIN OF CUSTODY

PAGE 1 OF 1

Date Rec'd in Lab: 9/25/20

ALPHA Job #: L2040737

ALPHA Analytical
8 Walkup Drive
Westboro, MA 01581
Tel: 508-898-9220

320 Forbes Blvd
Mansfield, MA 02048
Tel: 508-822-9300

Client Information

Client: Horsley Witten Group, Inc.
Address: 90 Route 6A
Sandwich MA 02563
Phone: (508)833-6600
Email: bmassa@horsleywitten.com

Additional Project Information:

Project Information

Project Name: Barnstable Airport
Project Location: Hyannis MA
Project #: 20102
Project Manager: Bryan Massa
ALPHA Quote #:

Turn-Around Time

☑ Standard ☐ RUSH (only confirmed if pre-approved)

Date Due:

Report Information - Data Deliverables

☐ ADEx ☐ EMAIL

Billing Information

☐ Same as Client info PO #:

Regulatory Requirements & Project Information Requirements

☐ Yes ☐ No MA MCP Analytical Methods ☐ Yes ☐ No CT RCP Analytical Methods
☐ Yes ☐ No Matrix Spike Required on this SDG? (Required for MCP Inorganics)
☐ Yes ☐ No GW1 Standards (Info Required for Metals & EPH with Targets)
☐ Yes ☐ No NPDES RGP
☐ Other State /Fed Program _____ Criteria _____

ANALYSIS

VOC: ☐ 8260 ☐ 624 ☐ 524.2
SVOC: ☐ ABN ☐ PAH
METALS: ☐ MCP 13 ☐ MCP 14 ☐ RCP 15
METALS: ☐ RCRA5 ☐ RCRA8 ☐ PP13
EPH: ☐ Ranges & Targets ☐ Ranges Only
VPH: ☐ Ranges & Targets ☐ Ranges Only
☐ PCB ☐ PEST
TPH: ☐ Quant Only ☐ Fingerprint
AZ-537-ISOTOPE-PFAS
PFAS isotope dilution - extract + hold

SAMPLE INFO
Filtration
☐ Field
☐ Lab to do
Preservation
☐ Lab to do

Sample Comments

TOTAL # BOTTLES

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler Initials				TOTAL # BOTTLES
L0737-01	A5 (12-14)	9/25/20	9:46	Soil	SB	(3)	X	✓	
-02	A5 (18-20)	9/25/20	9:57	Soil	SB	(3)	X	✓	
-03	A20 (0-1)	9/25/20	11:05	Soil	SB		✓		
-04	A20 (2-4)	9/25/20	11:11	Soil	SB		✓		
-05	A21 (0-1)	9/25/20	11:20	Soil	SB		✓		
-06	A19 (0-1)	9/25/20	11:35	Soil	SB		✓		
-07	A5 (2-4)	9/25/20	11:50	Soil	SB		✓		

Container Type
P= Plastic
A= Amber glass
V= Vial
G= Glass
B= Bacteria cup
C= Cube
O= Other
E= Encore
D= BOD Bottle

Preservative
A= None
B= HCl
C= HNO_3
D= H_2SO_4
E= NaOH
F= MeOH
G= $NaHSO_4$
H = $Na_2S_2O_3$
I= Ascorbic Acid
J = NH_4Cl
K= Zn Acetate
O= Other

	Container Type								
	Preservative								

Relinquished By:	Date/Time	Received By:	Date/Time
[illegible]	9/25/20 1230	[illegible]	9/25/20 1230
[illegible]	9/25/20 1732	[illegible]	9/25/20 1732
[illegible]	9/25/20 2034	[illegible]	9/25/20 2034

All samples submitted are subject to Alpha's Terms and Conditions. See reverse side.

FORM NO: 01-01 (rev. 12-Mar-2012)